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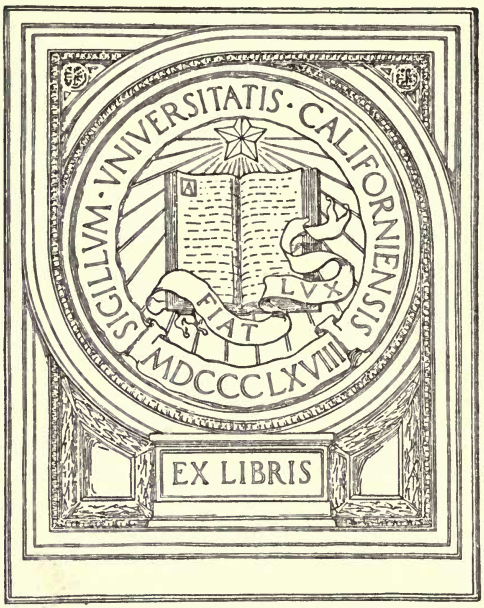
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MECHANICS' TABLES,

CONTAINING

AREAS AND CIRCUMFERENCES OF CIRCLES,
AND SIDES OF EQUAL SQUARES;

CIRCUMFERENCES OF ANGLED HOOPS,
ANGLED OUTSIDE AND INSIDE;

CUTTING OF BOILER PLATES,

COVERING OF SOLIDS, &c.,

AND WEIGHTS OF VARIOUS METALS,
&c., &c., &c., &c.

MISCELLANEOUS NOTES,

COMPRISING

DIMENSIONS OF MATERIALS, ALLOYS, PAINTS, LACKERS, &c.

BY CHARLES H. HASWELL,
MARINE ENGINEER.

NEW YORK:
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1856.

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TO

THE MECHANICS

OF THE

UNITED STATES OF AMERICA.

In the compilation and construction of the following tables and rules, my purpose has been that of furnishing for your ready reference such calculations and instructions as were best suited for the greatest number of you, and, at the same time, to limit the extent of the work within the requirements of convenience of reference and economy of cost.

My attention was first called to the demand for a work of this character by James Murphy, Esq., a proprietor of the Fulton Iron Works of this city, and I avail myself of this opportunity to express my thanks to him for his valuable suggestion.

CHAS. H. HASWELL,
6 Bowling Green, N. Y.

April 14*th*, 1856.

262652

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AREAS AND CIRCUMFERENCES OF CIRCLES,

From $\frac{1}{64}$th to 100.

Diam.	Area.	Circum.	Diam.	Area.	Circum.	Diam.	Area.	Circum.
$\frac{1}{64}$	.00019	.0490	4.	12.566	12.57	10.	78.540	31.42
$\frac{1}{32}$	.00076	.0951	$\frac{1}{8}$	13.364	12.96	$\frac{1}{8}$	80.515	31.81
$\frac{1}{16}$	.00306	.1963	$\frac{1}{4}$	14.186	13.35	$\frac{1}{4}$	82.516	32.20
$\frac{1}{8}$	.01227	.3926	$\frac{3}{8}$	15.033	13.74	$\frac{3}{8}$	84.540	32.59
$\frac{3}{16}$	.02761	.5890	$\frac{1}{2}$	15.904	14.14	$\frac{1}{2}$	86.590	32.99
$\frac{1}{4}$	.04908	.7854	$\frac{5}{8}$	16.800	14.53	$\frac{5}{8}$	88.664	33.38
$\frac{5}{16}$	.07669	.9817	$\frac{3}{4}$	17.720	14.92	$\frac{3}{4}$	90.762	33.77
$\frac{3}{8}$	.1104	1.178	$\frac{7}{8}$	18.665	15.32	$\frac{7}{8}$	92.885	34.16
$\frac{7}{16}$	.1503	1.374	5.	19.635	15.71	11.	95.033	34.56
$\frac{1}{2}$	.1963	1.571	$\frac{1}{8}$	20.629	16.10	$\frac{1}{8}$	97.205	34.95
$\frac{9}{16}$	.2485	1.767	$\frac{1}{4}$	21.648	16.49	$\frac{1}{4}$	99.402	35.34
$\frac{5}{8}$	.3067	1.963	$\frac{3}{8}$	22.690	16.89	$\frac{3}{8}$	101.62	35.74
$\frac{11}{16}$	.3712	2.159	$\frac{1}{2}$	23.758	17.28	$\frac{1}{2}$	103.87	36.13
$\frac{3}{4}$	.4417	2.356	$\frac{5}{8}$	24.850	17.67	$\frac{5}{8}$	106.14	36.52
$\frac{13}{16}$	.5174	2.551	$\frac{3}{4}$	25.967	18.06	$\frac{3}{4}$	108.43	36.91
$\frac{7}{8}$	.6013	2.749	$\frac{7}{8}$	27.108	18.46	$\frac{7}{8}$	110.75	37.31
$\frac{15}{16}$	.6902	2.945	6.	28.274	18.85	12.	113.10	37.70
1.	.7854	3.142	$\frac{1}{8}$	29.464	19.24	$\frac{1}{8}$	115.47	38.09
$\frac{1}{16}$	.9940	3.534	$\frac{1}{4}$	30.680	19.64	$\frac{1}{4}$	117.86	38.48
$\frac{1}{8}$	1.227	3.927	$\frac{3}{8}$	31.919	20.03	$\frac{3}{8}$	120.28	38.88
$\frac{3}{16}$	1.485	4.320	$\frac{1}{2}$	33.183	20.42	$\frac{1}{2}$	122.72	39.27
$\frac{1}{4}$	1.767	4.712	$\frac{5}{8}$	34.471	20.81	$\frac{5}{8}$	125.18	39.66
$\frac{5}{16}$	2.074	5.105	$\frac{3}{4}$	35.785	21.21	$\frac{3}{4}$	127.68	40.06
$\frac{3}{8}$	2.405	5.498	$\frac{7}{8}$	37.122	21.60	$\frac{7}{8}$	130.19	40.45
$\frac{7}{16}$	2.761	5.891	7.	38.484	21.99	13.	132.73	40.84
2.	3.142	6.283	$\frac{1}{8}$	39.871	22.38	$\frac{1}{8}$	135.30	41.23
$\frac{1}{16}$	3.547	6.676	$\frac{1}{4}$	41.282	22.78	$\frac{1}{4}$	137.89	41.63
$\frac{1}{8}$	3.976	7.069	$\frac{3}{8}$	42.718	23.17	$\frac{3}{8}$	140.50	42.02
$\frac{3}{16}$	4.430	7.461	$\frac{1}{2}$	44.179	23.56	$\frac{1}{2}$	143.14	42.41
$\frac{1}{4}$	4.909	7.854	$\frac{5}{8}$	45.663	23.95	$\frac{5}{8}$	145.80	42.80
$\frac{5}{16}$	5.412	8.247	$\frac{3}{4}$	47.173	24.35	$\frac{3}{4}$	148.49	43.20
$\frac{3}{8}$	5.940	8.639	$\frac{7}{8}$	48.707	24.74	$\frac{7}{8}$	151.20	43.59
$\frac{7}{16}$	6.492	9.032	8.	50.265	25.13	14.	153.94	43.98
3.	7.069	9.425	$\frac{1}{8}$	51.848	25.52	$\frac{1}{8}$	156.70	44.38
$\frac{1}{16}$	7.670	9.818	$\frac{1}{4}$	53.456	25.92	$\frac{1}{4}$	159.48	44.77
$\frac{1}{8}$	8.296	10.210	$\frac{3}{8}$	55.088	26.31	$\frac{3}{8}$	162.29	45.16
$\frac{3}{16}$	8.946	10.602	$\frac{1}{2}$	56.745	26.70	$\frac{1}{2}$	165.13	45.55
$\frac{1}{4}$	9.621	10.995	$\frac{5}{8}$	58.426	27.10	$\frac{5}{8}$	167.99	45.95
$\frac{5}{16}$	10.321	11.388	$\frac{3}{4}$	60.132	27.49	$\frac{3}{4}$	170.87	46.34
$\frac{3}{8}$	11.045	11.781	$\frac{7}{8}$	61.862	27.88	$\frac{7}{8}$	173.78	46.73
$\frac{7}{16}$	11.793	12.173	9.	63.617	28.27	15.	176.71	47.12
			$\frac{1}{8}$	65.396	28.66	$\frac{1}{8}$	179.67	47.52
			$\frac{1}{4}$	67.200	29.06	$\frac{1}{4}$	182.65	47.91
			$\frac{3}{8}$	69.029	29.45	$\frac{3}{8}$	185.66	48.30
			$\frac{1}{2}$	70.882	29.85	$\frac{1}{2}$	188.69	48.69
			$\frac{5}{8}$	72.759	30.24	$\frac{5}{8}$	191.75	49.09
			$\frac{3}{4}$	74.662	30.63	$\frac{3}{4}$	194.83	49.48
			$\frac{7}{8}$	76.588	31.02	$\frac{7}{8}$	197.93	49.87

TABLE—(Continued).

Diam.	Area.	Circum.	Diam.	Area.	Circum.	Diam.	Area.	Circum.
16.	201.06	50.27	23.	415.48	72.26	30.	706.86	94.25
⅛	204.22	50.66	⅛	420.	72.65	⅛	712.76	94.64
¼	207.39	51.05	¼	424.56	73.04	¼	718.69	95.03
⅜	210.60	51.44	⅜	429.13	73.43	⅜	724.64	95.43
½	213.82	51.84	½	433.74	73.83	½	730.62	95.82
⅝	217.08	52.23	⅝	438.36	74.22	⅝	736.62	96.21
¾	220.35	52.62	¾	443.01	74.61	¾	742.64	96.60
⅞	223.65	53.01	⅞	447.70	75.	⅞	748.69	97.
17.	226.98	53.41	24.	452.39	75.40	31.	754.77	97.39
⅛	230.33	53.80	⅛	457.11	75.79	⅛	760.87	97.78
¼	233.70	54.19	¼	461.86	76.18	¼	766.99	98.17
⅜	237.10	54.59	⅜	466.64	76.58	⅜	773.14	98.57
½	240.53	54.98	½	471.44	76.97	½	779.31	98.97
⅝	243.98	55.37	⅝	476.26	77.36	⅝	785.51	99.35
¾	247.45	55.76	¾	481.11	77.75	¾	791.73	99.75
⅞	250.95	56.16	⅞	485.98	78.15	⅞	797.98	100.14
18.	254.47	56.55	25.	490.87	78.54	32.	804.25	100.53
⅛	258.02	56.94	⅛	495.80	78.93	⅛	810.54	100.92
¼	261.59	57.33	¼	500.74	79.33	¼	816.86	101.32
⅜	265.18	57.73	⅜	505.71	79.72	⅜	823.21	101.71
½	268.80	58.12	½	510.71	80.11	½	829.58	102.10
⅝	272.45	58.51	⅝	515.72	80.50	⅝	835.97	102.49
¾	276.12	58.90	¾	520.77	80.90	¾	842.39	102.89
⅞	279.81	59.30	⅞	525.84	81.29	⅞	848.83	103.28
19.	283.53	59.69	26.	530.93	81.68	33.	855.30	103.67
⅛	287.27	60.08	⅛	536.05	82.07	⅛	861.79	104.06
¼	291.04	60.48	¼	541.19	82.47	¼	868.30	104.46
⅜	294.83	60.87	⅜	546.36	82.86	⅜	874.84	104.85
½	298.65	61.26	½	551.55	83.25	½	881.41	105.24
⅝	302.49	61.65	⅝	556.76	83.64	⅝	888.	105.64
¾	306.35	62.05	¾	562.	84.04	¾	894.62	106.03
⅞	310.25	62.44	⅞	567.27	84.43	⅞	901.25	106.42
20.	314.16	62.83	27.	572.56	84.82	34.	907.92	106.81
⅛	318.10	63.22	⅛	577.87	85.21	⅛	914.61	107.21
¼	322.06	63.62	¼	583.21	85.61	¼	921.32	107.60
⅜	326.05	64.01	⅜	588.57	86.	⅜	928.06	107.99
½	330.06	64.40	½	593.96	86.39	½	934.82	108.39
⅝	334.10	64.79	⅝	599.37	86.79	⅝	941.60	108.78
¾	338.16	65.19	¾	604.81	87.18	¾	948.42	109.17
⅞	342.25	65.58	⅞	610.27	87.57	⅞	955.25	109.56
21.	346.36	65.97	28.	615.75	87.96	35.	962.11	109.96
⅛	350.50	66.37	⅛	621.26	88.36	⅛	968.99	110.35
¼	354.66	66.76	¼	626.80	88.75	¼	975.91	110.74
⅜	358.84	67.15	⅜	632.36	89.14	⅜	982.84	111.13
½	363.05	67.54	½	637.94	89.54	½	989.80	111.53
⅝	367.28	67.94	⅝	643.55	89.93	⅝	996.78	111.92
¾	371.54	68.33	¾	649.18	90.32	¾	1003.79	112.31
⅞	375.83	68.72	⅞	654.84	90.71	⅞	1010.80	112.70
22.	380.13	69.12	29.	660.52	91.11	36.	1017.88	113.10
⅛	384.46	69.51	⅛	666.23	91.50	⅛	1024.95	113.49
¼	388.82	69.90	¼	671.96	91.89	¼	1032.06	113.88
⅜	393.20	70.29	⅜	677.71	92.28	⅜	1039.19	114.28
½	397.61	70.69	½	683.49	92.68	½	1046.35	114.67
⅝	402.04	71.08	⅝	689.30	93.07	⅝	1053.52	115.06
¾	406.49	71.47	¾	695.13	93.46	¾	1060.73	115.45
⅞	410.97	71.86	⅞	700.98	93.85	⅞	1067.95	115.85

TABLE—(Continued).

Diam.	Area.	Circum.	Diam.	Area.	Circum.	Diam.	Area.	Circum.
37.	1075.2	116.2	44.	1520.5	138.2	51.	2042.8	160.2
.1/8	1082.5	116.6	.1/8	1529.2	138.6	.1/8	2052.8	160.6
.1/4	1089.8	117.	.1/4	1537.9	139.	.1/4	2062.9	161.
.3/8	1097.1	117.4	.3/8	1546.5	139.4	.3/8	2072.9	161.3
.1/2	1104.5	117.8	.1/2	1555.3	139.8	.1/2	2083.1	161.8
.5/8	1111.8	118.2	.5/8	1564.	140.2	.5/8	2093.2	162.1
.3/4	1119.2	118.6	.3/4	1572.8	140.6	.3/4	2103.3	162.6
.7/8	1126.7	119.	.7/8	1581.6	141.	.7/8	2113.5	162.9
38.	1134.1	119.4	45.	1590.4	141.4	52.	2123.7	163.4
.1/8	1141.6	119.8	.1/8	1599.3	141.8	.1/8	2133.9	163.7
.1/4	1149.1	120.2	.1/4	1608.2	142.2	.1/4	2144.2	164.1
.3/8	1156.6	120.6	.3/8	1617.	142.6	.3/8	2154.4	164.5
.1/2	1164.2	121.	.1/2	1626.	142.9	.1/2	2164.8	164.9
.5/8	1171.7	121.3	.5/8	1634.9	143.3	.5/8	2175.	165.3
.3/4	1179.3	121.7	.3/4	1643.9	143.7	.3/4	2185.4	165.7
.7/8	1186.9	122.1	.7/8	1652.9	144.1	.7/8	2195.7	166.1
39.	1194.6	122.5	46.	1661.9	144.5	53.	2206.2	166.5
.1/8	1202.3	122.9	.1/8	1671.	144.9	.1/8	2216.6	166.8
.1/4	1210.	123.3	.1/4	1680.	145.3	.1/4	2227.	167.3
.3/8	1217.7	123.7	.3/8	1689.1	145.7	.3/8	2237.5	167.6
.1/2	1225.4	124.1	.1/2	1698.2	146.1	.1/2	2248.	168.1
.5/8	1233.2	124.5	.5/8	1707.4	146.5	.5/8	2258.5	168.4
.3/4	1241.	124.9	.3/4	1716.5	146.9	.3/4	2269.	168.9
.7/8	1248.8	125.3	.7/8	1725.7	147.3	.7/8	2279.6	169.2
40.	1256.6	125.6	47.	1734.9	147.7	54.	2290.2	169.6
.1/8	1264.5	126.	.1/8	1744.2	148.	.1/8	2300.8	170.
.1/4	1272.4	126.4	.1/4	1753.5	148.4	.1/4	2311.5	170.4
.3/8	1280.3	126.8	.3/8	1762.7	148.8	.3/8	2322.1	170.8
.1/2	1288.2	127.2	.1/2	1772.1	149.2	.1/2	2332.8	171.2
.5/8	1296.2	127.6	.5/8	1781.4	149.6	.5/8	2343.5	171.6
.3/4	1304.2	128.	.3/4	1790.8	150.	.3/4	2354.3	172.
.7/8	1312.2	128.4	.7/8	1800.1	150.4	.7/8	2365.	172.3
41.	1320.3	128.8	48.	1809.6	150.8	55.	2375.8	172.8
.1/8	1328.3	129.2	.1/8	1819.	151.2	.1/8	2386.6	173.1
.1/4	1336.4	129.6	.1/4	1828.5	151.6	.1/4	2397.5	173.6
.3/8	1344.5	130.	.3/8	1837.9	152.	.3/8	2408.3	173.9
.1/2	1352.7	130.4	.1/2	1847.5	152.4	.1/2	2419.2	174.4
.5/8	1360.8	130.8	.5/8	1857.	152.8	.5/8	2430.1	174.7
.3/4	1369.	131.2	.3/4	1866.5	153.2	.3/4	2441.	175.1
.7/8	1377.2	131.6	.7/8	1876.1	153.5	.7/8	2452.	175.5
42.	1385.4	131.9	49.	1885.7	153.9	56.	2463.	175.9
.1/8	1393.7	132.3	.1/8	1895.4	154.3	.1/8	2474.	176.3
.1/4	1402.	132.7	.1/4	1905.	154.7	.1/4	2485.	176.7
.3/8	1410.3	133.1	.3/8	1914.7	155.1	.3/8	2496.1	177.1
.1/2	1418.6	133.5	.1/2	1924.4	155.5	.1/2	2507.2	177.5
.5/8	1427.	133.9	.5/8	1934.1	155.9	.5/8	2518.2	177.8
.3/4	1435.4	134.3	.3/4	1943.9	156.3	.3/4	2529.4	178.3
.7/8	1443.8	134.7	.7/8	1953.7	156.7	.7/8	2540.5	178.6
43.	1452.2	135.1	50.	1963.5	157.1	57.	2551.8	179.1
.1/8	1460.6	135.5	.1/8	1973.3	157.4	.1/8	2562.9	179.4
.1/4	1469.1	135.9	.1/4	1983.2	157.9	.1/4	2574.2	179.9
.3/8	1477.6	136.3	.3/8	1993.	158.2	.3/8	2585.4	180.2
.1/2	1486.2	136.7	.1/2	2003.	158.7	.1/2	2596.7	180.6
.5/8	1494.7	137.1	.5/8	2012.8	159.	.5/8	2608.	181.
.3/4	1503.3	137.4	.3/4	2022.8	159.4	.3/4	2619.4	181.4
.7/8	1511.9	137.8	.7/8	2032.8	159.8	.7/8	2630.7	181.8

TABLE—(Continued).

Diam.	Area.	Circum.	Diam.	Area.	Circum.	Diam.	Area.	Circum.
58.	2642.1	182.2	65.	3318.3	204.2	72.	4071.5	226.2
.⅛	2653.4	182.6	.⅛	3331.	204.5	.⅛	4085.6	226.5
.¼	2664.9	183.	.¼	3343.9	205.	.¼	4099.8	227.
.⅜	2676.3	183.3	.⅜	3356.7	205.3	.⅜	4114.	227.3
.½	2687.8	183.8	.½	3369.6	205.8	.½	4128.2	227.7
.⅝	2699.3	184.1	.⅝	3382.4	206.1	.⅝	4142.5	228.1
.¾	2710.9	184.6	.¾	3395.3	206.6	.¾	4156.8	228.5
.⅞	2722.4	184.9	.⅞	3408.2	206.9	.⅞	4171.	228.9
59.	2734.	185.4	66.	3421.2	207.3	73.	4185.4	229.3
.⅛	2745.5	185.7	.⅛	3434.1	207.7	.⅛	4199.7	229.7
.¼	2757.2	186.1	.¼	3447.2	208.1	.¼	4214.1	230.1
.⅜	2768.8	186.5	.⅜	3460.1	208.5	.⅜	4228.5	230.5
.½	2780.5	186.9	.½	3473.2	208.9	.½	4242.9	230.9
.⅝	2792.2	187.3	.⅝	3486.3	209.3	.⅝	4257.3	231.3
.¾	2803.9	187.7	.¾	3499.4	209.7	.¾	4271.8	231.7
.⅞	2815.6	188.1	.⅞	3512.5	210.	.⅞	4286.3	232.
60.	2827.4	188.5	67.	3525.6	210.5	74.	4300.8	232.5
.⅛	2839.2	188.8	.⅛	3538.8	210.8	.⅛	4315.3	232.8
.¼	2851.	189.3	.¼	3552.	211.3	.¼	4329.9	233.2
.⅜	2862.8	189.6	.⅜	3565.2	211.6	.⅜	4344.5	233.6
.½	2874.8	190.1	.½	3578.5	212.1	.½	4359.2	234.
.⅝	2886.6	190.4	.⅝	3591.7	212.4	.⅝	4373.8	234.4
.¾	2898.5	190.9	.¾	3605.	212.8	.¾	4388.5	234.8
.⅞	2910.6	191.2	.⅞	3618.3	213.2	.⅞	4403.1	235.2
61.	2922.5	191.6	68.	3631.7	213.6	75.	4417.9	235.6
.⅛	2934.4	192.	.⅛	3645.	214.	.⅛	4432.6	236.
.¼	2946.5	192.4	.¼	3658.4	214.4	.¼	4447.4	236.4
.⅜	2958.5	192.8	.⅜	3671.8	214.8	.⅜	4462.1	236.7
.½	2970.6	193.2	.½	3685.3	215.2	.½	4447.	237.2
.⅝	2982.6	193.6	.⅝	3698.7	215.5	.⅝	4491.8	237.5
.¾	2994.8	194.	.¾	3712.2	215.9	.¾	4506.7	238.
.⅞	3006.9	194.3	.⅞	3725.7	216.3	.⅞	4521.5	238.3
62.	3019.1	194.8	69.	3739.3	216.7	76.	4536.5	238.8
.⅛	3031.2	195.1	.⅛	3752.8	217.1	.⅛	4551.4	239.1
.¼	3043.5	195.6	.¼	3766.4	217.5	.¼	4566.4	239.5
.⅜	3055.7	195.9	.⅜	3780.	217.9	.⅜	4581.3	239.9
.½	3068.	196.3	.½	3793.7	218.3	.½	4596.3	240.3
.⅝	3080.2	196.7	.⅝	3807.3	218.7	.⅝	4611.3	240.7
.¾	3092.6	197.1	.¾	3821.	219.1	.¾	4626.4	241.1
.⅞	3104.8	197.5	.⅞	3834.7	219.5	.⅞	4641.5	241.5
63.	3117.2	197.9	70.	3848.5	219.9	77.	4656.6	241.9
.⅛	3129.6	198.3	.⅛	3862.2	220.3	.⅛	4671.7	242.2
.¼	3142.	198.7	.¼	3876.	220.7	.¼	4686.9	242.7
.⅜	3154.4	199.	.⅜	3889.8	221.	.⅜	4702.1	243.
.½	3166.9	199.5	.½	3903.6	221.5	.½	4717.3	243.5
.⅝	3179.4	199.8	.⅝	3917.4	221.8	.⅝	4732.5	243.8
.¾	3191.9	200.3	.¾	3931.4	222.2	.¾	4747.8	244.3
.⅞	3204.4	200.6	.⅞	3945.2	222.6	.⅞	4763.	244.6
64.	3217.	201.1	71.	3959.2	223.	78.	4778.4	245.
.⅛	3229.5	201.4	.⅛	3973.1	223.4	.⅛	4793.7	245.4
.¼	3242.2	201.8	.¼	3987.1	223.8	.¼	4809.	245.8
.⅜	3254.8	202.2	.⅜	4001.1	224.2	.⅜	4824.4	246.2
.½	3267.5	202.6	.½	4015.2	224.6	.½	4839.8	246.6
.⅝	3280.1	203.	.⅝	4029.2	225.	.⅝	4855.2	247.
.¾	3292.8	203.4	.¾	4043.3	225.4	.¾	4870.8	247.4
.⅞	3305.5	203.8	.⅞	4057.4	225.8	.⅞	4886.1	247.7

TABLE—(Continued).

Diam.	Area.	Circum.
79.	4901.7	248.2
.1/8	4917.2	248.5
.1/4	4932.7	249.
.3/8	4948.3	249.3
.1/2	4963.9	249.8
.5/8	4979.5	250.1
.3/4	4995.2	250.5
.7/8	5010.8	250.9
80.	5026.5	251.3
.1/8	5042.2	251.7
.1/4	5058.	252.1
.3/8	5073.7	252.5
.1/2	5089.6	252.9
.5/8	5105.4	253.3
.3/4	5121.2	253.7
.7/8	5137.1	254.1
81.	5153.	254.5
.1/8	5168.9	254.9
.1/4	5184.9	255.3
.3/8	5200.8	255.6
.1/2	5216.8	256.
.5/8	5232.8	256.4
.3/4	5248.9	256.8
.7/8	5264.9	257.2
82.	5281.	257.6
.1/8	5297.1	258.
.1/4	5313.3	258.4
.3/8	5329.4	258.8
.1/2	5345.6	259.2
.5/8	5361.8	259.6
.3/4	5378.1	260.
.7/8	5394.3	260.4
83.	5410.6	260.8
.1/8	5426.9	261.1
.1/4	5443.3	261.5
.3/8	5459.6	261.9
.1/2	5476.	262.3
.5/8	5492.4	262.7
.3/4	5508.8	263.1
.7/8	5525.3	263.5
84.	5541.8	263.9
.1/8	5558.3	264.3
.1/4	5574.8	264.7
.3/8	5591.3	265.
.1/2	5607.9	265.5
.5/8	5624.5	265.8
.3/4	5641.2	266.2
.7/8	5657.8	266.6
85.	5674.5	267.
.1/8	5691.2	267.4
.1/4	5707.9	267.8
.3/8	5724.6	268.2
.1/2	5741.5	268.6
.5/8	5758.2	268.9
.3/4	5775.1	269.4
.7/8	5791.9	269.7
86.	5808.8	270.2
.1/8	5825.7	270.5
.1/4	5842.6	271.
.3/8	5859.5	271.3
.1/2	5876.5	271.7
.5/8	5893.5	272.1
.3/4	5910.6	272.5
.7/8	5927.6	272.9
87.	5944.7	273.3
.1/8	5961.7	273.7
.1/4	5978.9	274.1
.3/8	5996.	274.4
.1/2	6013.2	274.9
.5/8	6030.4	275.2
.3/4	6047.6	275.7
.7/8	6064.8	276.
88.	6082.1	276.5
.1/8	6099.4	276.8
.1/4	6116.7	277.2
.3/8	6134.	277.6
.1/2	6151.4	278.
.5/8	6168.8	278.4
.3/4	6186.2	278.8
.7/8	6203.6	279.2
89.	6221.1	279.6
.1/8	6238.6	280.
.1/4	6256.1	280.4
.3/8	6273.6	280.8
.1/2	6291.2	281.2
.5/8	6308.8	281.6
.3/4	6326.4	282.
.7/8	6344.	282.3
90.	6361.7	282.7
.1/8	6379.4	283.1
.1/4	6397.1	283.5
.3/8	6414.8	283.9
.1/2	6432.6	284.3
.5/8	6450.4	284.7
.3/4	6468.2	285.1
.7/8	6486.	285.5
91.	6503.9	285.9
.1/8	6521.7	286.3
.1/4	6539.7	286.7
.3/8	6557.6	287.1
.1/2	6575.5	287.5
.5/8	6593.5	287.8
.3/4	6611.5	288.2
.7/8	6629.5	288.6
92.	6647.6	289.
.1/8	6665.7	289.4
.1/4	6683.8	289.8
.3/8	6701.9	290.2
.1/2	6720.1	290.6
.5/8	6738.2	291.
.3/4	6756.4	291.4
.7/8	6774.7	291.8
93.	6792.9	292.2
.1/8	6811.1	292.6
.1/4	6829.5	293.
.3/8	6847.8	293.4
.1/2	6866.1	293.7
.5/8	6884.5	294.1
.3/4	6902.9	294.5
.7/8	6921.3	294.9
94.	6939.8	295.3
.1/8	6958.2	295.7
.1/4	6976.7	296.1
.3/8	6995.2	296.5
.1/2	7013.8	296.9
.5/8	7032.3	297.3
.3/4	7051.	297.7
.7/8	7069.5	298.1
95.	7088.2	298.5
.1/8	7106.9	298.8
.1/4	7125.6	299.2
.3/8	7144.3	299.6
.1/2	7163.	300.
.5/8	7181.8	300.4
.3/4	7200.6	300.8
.7/8	7219.4	301.2
96.	7238.2	301.6
.1/8	7257.1	302.
.1/4	7276.	302.4
.3/8	7294.9	302.8
.1/2	7313.8	303.2
.5/8	7332.8	303.5
.3/4	7351.8	303.9
.7/8	7370.7	304.3
97.	7389.8	304.7
.1/8	7408.8	305.1
.1/4	7428.	305.5
.3/8	7447.	305.9
.1/2	7466.2	306.3
.5/8	7485.3	306.7
.3/4	7504.5	307.1
.7/8	7523.7	307.5
98.	7543.	307.9
.1/8	7562.2	308.3
.1/4	7581.5	308.7
.3/8	7600.8	309.
.1/2	7620.1	309.4
.5/8	7639.4	309.8
.3/4	7658.9	310.2
.7/8	7678.2	310.6
99.	7697.7	311.
.1/8	7717.1	311.4
.1/4	7736.6	311.8
.3/8	7756.1	312.2
.1/2	7775.6	312.6
.5/8	7795.2	313.
.3/4	7814.8	313.4
.7/8	7834.3	313.8
100.	7854.	314.2

AREAS AND CIRCUMFERENCES OF CIRCLES AND SIDES OF EQUAL SQUARES,

FROM 1 TO 50, FEET OR INCHES,

Advancing by an inch or twelfth of an inch.

Diam.	Area.	Circum.	Side of Equal Sq.	Diam.	Area.	Circum.	Side of Equal Sq.
1.	.785	3.142	.886	5.	19.635	15.708	4.431
.1	.922	3.403	.960	.1	20.295	15.970	4.505
.2	1.069	3.665	1.034	.2	20.966	16.232	4.579
.3	1.227	3.927	1.107	.3	21.643	16.493	4.652
.4	1.396	4.189	1.181	.4	22.340	16.755	4.726
.5	1.576	4.450	1.255	.5	23.044	17.017	4.800
.6	1.767	4.712	1.329	.6	23.758	17.278	4.874
.7	1.969	4.974	1.403	.7	24.484	17.541	4.945
.8	2.181	5.236	1.477	.8	25.220	17.802	5.022
.9	2.405	5.498	1.550	.9	25.967	18.064	5.095
.10	2.640	5.760	1.624	.10	26.725	18.326	5.169
.11	2.885	6.021	1.698	.11	27.494	18.588	5.243
2.	3.142	6.283	1.772	6.	28.274	18.849	5.317
.1	3.409	6.545	1.845	.1	29.065	19.111	5.391
.2	3.687	6.807	1.919	.2	29.867	19.373	5.465
.3	3.976	7.069	1.994	.3	30.680	19.635	5.538
.4	4.276	7.330	2.067	.4	31.503	19.897	5.612
.5	4.587	7.592	2.142	.5	32.338	20.159	5.687
.6	4.909	7.854	2.215	.6	33.183	20.420	5.760
.7	5.241	8.116	2.287	.7	34.039	20.682	5.834
.8	5.585	8.378	2.363	.8	34.907	20.944	5.908
.9	5.940	8.639	2.437	.9	35.785	21.206	5.982
.10	6.305	8.901	2.511	.10	36.674	21.468	6.056
.11	6.681	9.163	2.584	.11	37.574	21.729	6.130
3.	7.069	9.425	2.658	7.	38.485	21.991	6.203
.1	7.467	9.687	2.731	.1	39.406	22.253	6.278
.2	7.876	9.948	2.806	.2	40.339	22.515	6.352
.3	8.296	10.210	2.880	.3	41.283	22.777	6.425
.4	8.727	10.472	2.953	.4	42.237	23.038	6.499
.5	9.168	10.734	3.027	.5	43.202	23.300	6.573
.6	9.621	10.996	3.101	.6	44.179	23.562	6.646
.7	10.085	11.257	3.175	.7	45.166	23.824	6.721
.8	10.559	11.519	3.249	.8	46.164	24.086	6.745
.9	11.045	11.781	3.323	.9	47.173	24.347	6.868
.10	11.541	12.042	3.397	.10	48.193	24.609	6.942
.11	12.048	12.305	3.471	.11	49.224	24.871	7.016
4.	12.566	12.566	3.544	8.	50.266	25.133	7.089
.1	13.095	12.828	3.618	.1	51.318	25.395	7.164
.2	13.635	13.090	3.692	.2	52.382	25.656	7.238
.3	14.186	13.352	3.766	.3	53.456	25.918	7.311
.4	14.748	13.614	3.840	.4	54.541	26.180	7.385
.5	15.321	13.875	3.913	.5	55.638	26.442	7.459
.6	15.904	14.137	3.988	.6	56.745	26.704	7.532
.7	16.499	14.399	4.061	.7	57.863	26.965	7.606
.8	17.104	14.661	4.135	.8	58.992	27.227	7.681
.9	17.720	14.923	4.209	.9	60.132	27.489	7.754
.10	18.348	15.184	4.283	.10	61.283	27.750	7.828
.11	18.985	15.446	4.357	.11	62.445	28.013	7.902

TABLE—(Continued).

Diam.	Area.	Circum.	Side of Equal Sq.	Diam.	Area.	Circum.	Side of Equal Sq.
9.	63.617	28.274	7.976	13.6	143.139	42.412	11.964
.1	64.801	28.536	8.050	.7	144.911	42.673	12.038
.2	65.995	28.798	8.124	.8	146.695	42.935	12.112
.3	67.201	29.060	8.197	.9	148.490	43.197	12.185
.4	68.417	29.322	8.272	.10	150.294	43.459	12.259
.5	69.644	29.583	8.346	.11	152.111	43.721	12.333
.6	70.882	29.845	8.419	14.	153.938	43.982	12.407
.7	72.131	30.107	8.493	.1	155.776	44.244	12.481
.8	73.391	30.369	8.567	.2	157.625	44.506	12.554
.9	74.662	30.631	8.640	.3	159.485	44.768	12.628
.10	75.943	30.892	8.715	.4	161.355	45.030	12.702
.11	77.236	31.154	8.789	.5	163.237	45.291	12.776
10.	78.540	31.416	8.862	.6	165.130	45.553	12.850
.1	79.854	31.678	8.936	.7	167.033	45.815	12.924
.2	81.180	31.940	9.010	.8	168.948	46.077	12.997
.3	82.516	32.201	9.083	.9	170.874	46.339	13.071
.4	83.863	32.463	9.158	.10	172.809	46.600	13.145
.5	85.221	32.725	9.232	.11	174.757	46.862	13.219
.6	86.590	32.987	9.305	15.	176.715	47.124	13.293
.7	87.970	33.249	9.379	.1	178.683	47.386	13.367
.8	89.361	33.510	9.453	.2	180.663	47.648	13.441
.9	90.763	33.772	9.526	.3	182.655	47.909	13.514
.10	92.175	34.034	9.601	.4	184.656	48.171	13.588
.11	93.599	34.296	9.674	.5	186.668	48.433	13.662
11.	95.033	34.558	9.748	.6	188.692	48.695	13.736
.1	96.478	34.819	9.822	.7	190.726	48.957	13.810
.2	97.935	35.081	9.896	.8	192.772	49.218	13.884
.3	99.402	35.343	9.970	.9	194.828	49.480	13.958
.4	100.880	35.605	10.044	.10	196.895	49.742	14.032
.5	102.369	35.867	10.118	.11	198.973	50.004	14.106
.6	103.869	36.128	10.191	16.	201.062	50.266	14.179
.7	105.379	36.390	10.265	.1	203.162	50.527	14.253
.8	106.901	36.652	10.339	.2	205.273	50.789	14.327
.9	108.434	36.914	10.413	.3	207.395	51.051	14.401
.10	109.977	37.176	10.488	.4	209.526	51.313	14.475
.11	111.532	37.437	10.562	.5	211.670	51.575	14.549
12.	113.098	37.699	10.634	.6	213.825	51.836	14.622
.1	114.673	37.961	10.709	.7	215.990	52.098	14.696
.2	116.261	38.223	10.783	.8	218.166	52.360	14.770
.3	117.860	38.485	10.856	.9	220.354	52.622	14.844
.4	119.467	38.746	10.930	.10	222.551	52.884	14.918
.5	121.088	39.008	11.004	.11	224.760	53.145	14.991
.6	122.719	39.270	11.077	17.	226.981	53.407	15.065
.7	124.360	39.532	11.151	.1	229.211	53.669	15.139
.8	126.013	39.794	11.225	.2	231.453	53.931	15.213
.9	127.677	40.055	11.299	.3	233.706	54.193	15.287
.10	129.350	40.317	11.373	.4	235.968	54.454	15.360
.11	131.036	40.579	11.447	.5	238.243	54.716	15.434
13.	132.733	40.841	11.520	.6	240.529	54.978	15.508
.1	134.439	41.103	11.594	.7	242.824	55.240	15.582
.2	136.157	41.364	11.668	.8	245.132	55.502	15.656
.3	137.887	41.626	11.742	.9	247.450	55.763	15.730
.4	139.626	41.888	11.816	.10	249.778	56.025	15.804
.5	141.377	42.150	11.889	.11	252.118	56.287	15.878

TABLE—(Continued).

Diam.	Area.	Circum.	Side of Equal Sq.	Diam.	Area.	Circum.	Side of Equal Sq.
18.	254.470	56.549	15.952	22.6	397.609	70.686	19.940
.1	256.830	56.811	16.026	.7	400.558	70.948	20.014
.2	259.203	57.072	16.100	.8	403.520	71.210	20.088
.3	261.587	57.334	16.173	.9	406.494	71.471	20.161
.4	263.981	57.596	16.247	.10	409.476	71.733	20.235
.5	266.386	57.858	16.321	.11	412.471	71.995	20.309
.6	268.803	58.120	16.395	23.	415.477	72.257	20.383
.7	271.229	58.381	16.469	.1	418.492	72.519	20.457
.8	273.668	58.643	16.543	.2	421.519	72.780	20.530
.9	276.117	58.905	16.616	.3	424.558	73.042	20.604
.10	278.576	59.167	16.690	.4	427.606	73.304	20.678
.11	281.047	59.429	16.764	.5	430.666	73.566	20.752
19.	283.529	59.690	16.838	.6	433.737	73.828	20.826
.1	286.021	59.952	16.911	.7	436.818	74.089	20.900
.2	288.525	60.214	16.985	.8	439.911	74.351	20.974
.3	291.040	60.476	17.059	.9	443.015	74.613	21.047
.4	293.564	60.738	17.133	.10	446.128	74.875	21.121
.5	296.101	60.999	17.207	.11	449.254	75.137	21.195
.6	298.648	61.261	17.281	24.	452.390	75.398	21.269
.7	301.205	61.523	17.355	.1	455.536	75.660	21.343
.8	303.775	61.785	17.429	.2	458.695	75.922	21.417
.9	306.355	62.047	17.502	.3	461.864	76.184	21.491
.10	308.945	62.308	17.576	.4	465.043	76.446	21.565
.11	311.547	62.570	17.650	.5	468.234	76.707	21.639
20.	314.160	62.832	17.724	.6	471.436	76.969	21.712
.1	316.782	63.094	17.798	.7	474.648	77.231	21.786
.2	319.417	63.356	17.871	.8	477.872	77.493	21.860
.3	322.063	63.617	17.946	.9	481.107	77.755	21.934
.4	324.718	63.879	18.020	.10	484.351	78.016	22.007
.5	327.386	64.141	18.094	.11	487.607	78.278	22.081
.6	330.064	64.403	18.167	25.	490.875	78.540	22.155
.7	332.752	64.665	18.241	.1	494.152	78.802	22.229
.8	335.453	64.926	18.315	.2	497.441	79.064	22.302
.9	338.164	65.188	18.389	.3	500.742	79.325	22.377
.10	340.884	65.450	18.463	.4	504.051	79.587	22.450
.11	343.617	65.712	18.536	.5	507.373	79.849	22.524
21.	346.361	65.974	18.610	.6	510.706	80.111	22.598
.1	349.115	66.235	18.684	.7	514.048	80.373	22.672
.2	351.880	66.497	18.758	.8	517.403	80.634	22.746
.3	354.657	66.759	18.832	.9	520.769	80.896	22.820
.4	357.443	67.021	18.906	.10	524.144	81.158	22.894
.5	360.241	67.283	18.980	.11	527.532	81.420	22.968
.6	363.051	67.544	19.053	26.	530.930	81.682	23.041
.7	365.870	67.806	19.127	.1	534.338	81.943	23.115
.8	368.701	68.068	19.201	.2	537.758	82.205	23.189
.9	371.543	68.330	19.275	.3	541.190	82.467	23.263
.10	374.395	68.592	19.349	.4	544.630	82.729	23.337
.11	377.259	68.853	19.422	.5	548.083	82.991	23.411
22.	380.134	69.115	19.496	.6	551.547	83.252	23.485
.1	383.018	69.377	19.570	.7	555.020	83.514	23.558
.2	385.914	69.639	19.644	.8	558.506	83.776	23.632
.3	388.822	69.901	19.718	.9	562.003	84.038	23.706
.4	391.739	70.162	19.791	.10	565.508	84.300	23.780
.5	394.668	70.424	19.865	.11	569.027	84.561	23.853

TABLE—(Continued).

Diam.	Area.	Circum.	Side of Equal Sq.	Diam.	Area.	Circum.	Side of Equal Sq.
27.	572.557	84.823	23.928	31.6	779.313	98.960	27.916
.1	576.095	85.085	24.001	.7	783.440	99.222	27.990
.2	579.646	85.347	24.075	.8	787.581	99.484	28.064
.3	583.209	85.609	24.149	.9	791.732	99.746	28.137
.4	586.780	85.870	24.223	.10	795.892	100.008	28.211
.5	590.364	86.132	24.297	.11	800.065	100.269	28.285
.6	593.959	86.394	24.371	32.	804.250	100.531	28.359
.7	597.563	86.656	24.445	.1	808.442	100.793	28.433
.8	601.179	86.918	24.519	.2	812.648	101.055	28.507
.9	604.807	87.179	24.592	.3	816.865	101.317	28.580
.10	608.444	87.441	24.666	.4	821.090	101.578	28.654
.11	612.093	87.703	24.740	.5	825.329	101.840	28.728
28.	615.754	87.965	24.814	.6	829.579	102.102	28.802
.1	619.423	88.227	24.888	.7	833.837	102.364	28.876
.2	623.105	88.488	24.961	.8	838.108	102.626	28.950
.3	626.798	88.750	25.035	.9	842.391	102.887	29.023
.4	630.500	89.012	25.109	.10	846.681	103.149	29.097
.5	634.215	89.274	25.183	.11	850.986	103.411	29.171
.6	637.941	89.536	25.257	33.	855.301	103.673	29.245
.7	641.676	89.797	25.331	.1	859.624	103.935	29.319
.8	645.424	90.059	25.405	.2	863.961	104.196	29.392
.9	649.182	90.321	25.479	.3	868.309	104.458	29.467
.10	652.950	90.583	25.552	.4	872.665	104.720	29.541
.11	656.730	90.845	25.626	.5	877.035	104.982	29.615
29.	660.521	91.106	25.700	.6	881.415	105.244	29.688
.1	664.321	91.368	25.774	.7	885.804	105.505	29.762
.2	668.135	91.630	25.848	.8	890.206	105.767	29.836
.3	671.959	91.892	25.922	.9	894.620	106.030	29.910
.4	675.792	92.154	25.996	.10	899.041	106.291	29.984
.5	679.638	92.415	26.070	.11	903.476	106.553	30.058
.6	683.494	92.677	26.143	34.	907.922	106.814	30.131
.7	687.360	92.939	26.217	.1	912.377	107.076	30.205
.8	691.239	93.201	26.291	.2	916.845	107.338	30.279
.9	695.128	93.463	26.365	.3	921.323	107.600	30.353
.10	699.626	93.724	26.439	.4	925.810	107.862	30.427
.11	702.938	93.986	26.513	.5	930.311	108.123	30.501
30.	706.860	94.248	26.586	.6	934.822	108.385	30.574
.1	710.791	94.510	26.660	.7	939.342	108.647	30.648
.2	714.735	94.772	26.734	.8	943.875	108.909	30.722
.3	718.690	95.033	26.808	.9	948.420	109.171	30.796
.4	722.654	95.295	26.882	.10	952.972	109.432	30.870
.5	726.631	95.557	26.956	.11	957.538	109.694	30.944
.6	730.618	95.819	27.029	35.	962.115	109.956	31.017
.7	734.615	96.081	27.103	.1	966.700	110.218	31.091
.8	738.624	96.342	27.177	.2	971.299	110.480	31.165
.9	742.645	96.604	27.251	.3	975.909	110.741	31.239
.10	746.674	96.866	27.325	.4	980.526	111.003	31.313
.11	750.716	97.128	27.399	.5	985.158	111.265	31.386
31.	754.769	97.390	27.473	.6	989.800	111.527	31.461
.1	758.831	97.651	27.547	.7	994.451	111.789	31.534
.2	762.906	97.913	27.621	.8	999.115	112.050	31.608
.3	766.992	98.175	27.694	.9	1003.790	112.312	31.682
.4	771.087	98.437	27.768	.10	1008.474	112.574	31.756
.5	775.194	98.699	27.842	.11	1013.171	112.836	31.829

TABLE—(Continued).

Diam.	Area.	Circum.	Side of Equal Sq.	Diam.	Area.	Circum.	Side of Equal Sq.
36.	1017.878	113.098	31.904	40.6	1288.252	127.235	35.892
.1	1022.594	113.359	31.978	.7	1293.557	127.497	35.966
.2	1027.324	113.621	32.052	.8	1298.876	127.758	36.039
.3	1032.065	113.883	32.125	.9	1304.206	128.020	36.113
.4	1036.813	114.145	32.199	.10	1309.543	128.282	36.187
.5	1041.576	114.407	32.273	.11	1314.895	128.544	36.261
.6	1046.349	114.668	32.347	41.	1320.257	128.806	36.335
.7	1051.131	114.930	32.421	.1	1325.628	129.067	36.408
.8	1055.926	115.192	32.494	.2	1331.012	129.329	36.482
.9	1060.732	115.454	32.568	.3	1336.407	129.591	36.556
.10	1065.546	115.776	32.642	.4	1341.810	129.853	36.630
.11	1070.374	115.977	32.716	.5	1347.227	130.115	36.704
37.	1075.213	116.239	32.790	.6	1352.655	130.376	36.778
.1	1080.059	116.501	32.863	.7	1358.091	130.638	36.852
.2	1084.920	116.763	32.937	.8	1363.541	130.900	36.926
.3	1089.792	117.025	33.011	.9	1369.001	131.162	36.999
.4	1094.671	117.286	33.085	.10	1374.470	131.424	37.073
.5	1099.564	117.548	33.159	.11	1379.952	131.685	37.147
.6	1104.469	117.810	33.233	42.	1385.446	131.947	37.221
.7	1109.381	118.072	33.307	.1	1390.247	132.209	37.295
.8	1114.307	118.334	33.381	.2	1396.462	132.471	37.369
.9	1119.244	118.595	33.455	.3	1401.988	132.733	37.443
.10	1124.189	118.857	33.529	.4	1407.522	132.994	37.517
.11	1129.148	119.119	33.603	.5	1413.070	133.256	37.591
38.	1134.118	119.381	33.676	.6	1418.629	133.518	37.664
.1	1139.095	119.643	33.750	.7	1424.195	133.780	37.738
.2	1144.087	119.904	33.824	.8	1429.776	134.042	37.812
.3	1149.089	120.166	33.898	.9	1435.368	134.303	37.886
.4	1154.100	120.428	33.972	.10	1440.967	134.565	37.960
.5	1159.124	120.690	34.045	.11	1446.580	134.827	38.033
.6	1164.159	120.952	34.119	43.	1452.205	135.089	38.107
.7	1169.202	121.213	34.193	.1	1457.837	135.351	38.181
.8	1174.259	121.475	34.267	.2	1463.483	135.612	38.255
.9	1179.327	121.737	34.341	.3	1469.140	135.874	38.329
.10	1184.403	121.999	34.414	.4	1474.804	136.136	38.402
.11	1189.493	122.261	34.488	.5	1480.483	136.398	38.476
39.	1194.593	122.522	34.562	.6	1486.173	136.660	38.550
.1	1199.720	122.784	34.636	.7	1491.871	136.921	38.624
.2	1204.824	123.046	34.710	.8	1497.582	137.183	38.698
.3	1209.958	123.308	34.784	.9	1503.305	137.445	38.772
.4	1215.099	123.570	34.858	.10	1509.035	137.707	38.846
.5	1220.254	123.831	34.932	.11	1514.779	137.969	38.920
.6	1225.420	124.093	35.005	44.	1520.534	138.230	38.993
.7	1230.594	124.355	35.079	.1	1526.297	138.492	39.067
.8	1235.782	124.617	35.153	.2	1532.074	138.754	39.141
.9	1240.981	124.879	35.227	.3	1537.862	139.016	39.215
.10	1246.188	125.140	35.301	.4	1543.658	139.278	39.289
.11	1251.408	125.402	35.374	.5	1549.468	139.539	39.363
40.	1256.640	125.664	35.449	.6	1555.288	139.801	39.437
.1	1261.879	125.926	35.523	.7	1561.117	140.063	39.511
.2	1267.133	126.188	35.597	.8	1566.960	140.325	39.585
.3	1272.397	126.449	35.670	.9	1572.813	140.587	39.658
.4	1277.669	126.711	35.744	.10	1578.674	140.848	39.732
.5	1282.955	126.973	35.818	.11	1584.549	141.110	39.806

TABLE—(Continued).

Diam.	Area.	Circum.	Side of Equal Sq.	Diam.	Area.	Circum.	Side of Equal Sq.
45.	1590.435	141.372	39.880	47.6	1772.059	149.226	42.095
.1	1596.329	141.634	39.954	.7	1778.280	149.488	42.169
.2	1602.237	141.896	40.027	.8	1784.515	149.750	42.243
.3	1608.156	142.157	40.101	.9	1790.761	150.011	42.317
.4	1614.082	142.419	40.175	.10	1797.015	150.273	42.390
.5	1620.023	142.681	40.249	.11	1803.283	150.535	42.464
.6	1625.974	142.983	40.323	48.	1809.562	150.797	42.538
.7	1631.933	143.205	40.396	.1	1815.848	151.059	42.612
.8	1637.907	143.466	40.470	.2	1822.149	151.320	42.686
.9	1643.891	143.728	40.544	.3	1828.460	151.582	42.760
.10	1649.883	143.990	40.618	.4	1834.779	151.844	42.834
.11	1655.889	144.252	40.692	.5	1841.113	152.106	42.908
46.	1661.906	144.514	40.766	.6	1847.457	152.368	42.982
.1	1667.931	144.775	40.840	.7	1853.809	152.630	43.056
.2	1673.970	145.037	40.914	.8	1860.175	152.891	43.130
.3	1680.020	145.299	40.987	.9	1866.552	153.153	43.203
.4	1686.077	145.561	41.061	.10	1872.937	153.415	43.277
.5	1692.149	145.823	41.135	.11	1879.335	153.677	43.351
.6	1698.231	146.084	41.209	49.	1885.745	153.938	43.425
.7	1704.321	146.346	41.283	.1	1892.172	154.200	43.499
.8	1710.425	146.608	41.357	.2	1898.504	154.462	43.572
.9	1716.541	146.870	41.431	.3	1905.037	154.724	43.646
.10	1722.663	147.132	41.505	.4	1911.497	154.986	43.720
.11	1728.801	147.393	41.579	.5	1917.961	155.247	43.794
47.	1734.949	147.655	41.652	.6	1924.426	155.510	43.868
.1	1741.104	147.917	41.726	.7	1930.919	155.771	43.941
.2	1747.274	148.179	41.800	.8	1937.316	156.033	44.015
.3	1753.455	148.441	41.874	.9	1943.914	156.295	44.089
.4	1759.643	148.702	41.948	.10	1950.439	156.556	44.163
.5	1765.845	148.964	42.021	.11	1956.969	156.818	44.237
				50.	1963.500	157.080	44.311

CIRCUMFERENCES OF CIRCLES,

FROM 1 INCH TO 20 FEET,

Advancing by an eighth of an inch.

Diam.	Circum.	Diam.	Circum.	Diam.	Circum.	Diam.	Circum.
INCH.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.
1.	0 3 1/8	0 7	1 9 7/8	1 1	3 4 3/4	1 7	4 11 5/8
1/8	0 3 1/2	0 7 1/8	1 10 3/8	1 1 1/8	3 5 1/8	1 7 1/8	5
1/4	0 3 7/8	0 7 1/4	1 10 3/4	1 1 1/4	3 5 1/2	1 7 1/4	5 0 3/8
3/8	0 4 1/4	0 7 3/8	1 11 1/8	1 1 3/8	3 6	1 7 3/8	5 0 7/8
1/2	0 4 5/8	0 7 1/2	1 11 1/2	1 1 1/2	3 6 3/4	1 7 1/2	5 1 1/4
5/8	0 5	0 7 5/8	1 11 7/8	1 1 5/8	3 6 3/4	1 7 5/8	5 1 5/8
3/4	0 5 3/8	0 7 3/4	2 0 1/4	1 1 3/4	3 7 1/8	1 7 3/4	5 2
7/8	0 5 7/8	0 7 7/8	2 0 5/8	1 1 7/8	3 7 1/2	1 7 7/8	5 2 3/8
2.	0 6 1/4	0 8	2 1 1/8	1 2	3 7 7/8	1 8	5 2 3/4
1/8	0 6 5/8	0 8 1/8	2 1 1/2	1 2 1/8	3 8 1/4	1 8 1/8	5 3 1/8
1/4	0 7	0 8 1/4	2 1 7/8	1 2 1/4	3 8 3/4	1 8 1/4	5 3 5/8
3/8	0 7 3/8	0 8 3/8	2 2 1/4	1 2 3/8	3 9 1/8	1 8 3/8	5 4
1/2	0 7 7/8	0 8 1/2	2 2 5/8	1 2 1/2	3 9 1/2	1 8 1/2	5 4 3/8
5/8	0 8 1/4	0 8 5/8	2 3	1 2 5/8	3 9 7/8	1 8 5/8	5 4 3/4
3/4	0 8 5/8	0 8 3/4	2 3 3/8	1 2 3/4	3 10 1/4	1 8 3/4	5 5 1/8
7/8	0 9	0 8 7/8	2 3 7/8	1 2 7/8	3 10 5/8	1 8 7/8	5 5 1/2
3.	0 9 3/8	0 9	2 4 1/4	1 3	3 11	1 9	5 5 7/8
1/8	0 9 3/4	0 9 1/8	2 4 5/8	1 3 1/8	3 11 1/2	1 9 1/8	5 6 1/4
1/4	0 10 1/8	0 9 1/4	2 5	1 3 1/4	3 11 7/8	1 9 1/4	5 6 3/4
3/8	0 10 1/2	0 9 3/8	2 5 3/8	1 3 3/8	4 0 1/4	1 9 3/8	5 7 1/8
1/2	0 10 7/8	0 9 1/2	2 5 7/8	1 3 1/2	4 0 5/8	1 9 1/2	5 7 1/2
5/8	0 11 1/4	0 9 5/8	2 6 1/4	1 3 5/8	4 1	1 9 5/8	5 8
3/4	0 11 3/4	0 9 3/4	2 6 5/8	1 3 3/4	4 1 3/8	1 9 3/4	5 8 3/4
7/8	1 0 1/8	0 9 7/8	2 7	1 3 7/8	4 1 7/8	1 9 7/8	5 8 1/4
4.	1 0 1/2	0 10	2 7 3/8	1 4	4 2 1/4	1 10	5 9
1/8	1 0 7/8	0 10 1/8	2 7 7/8	1 4 1/8	4 2 5/8	1 10 1/8	5 9 1/2
1/4	1 1 1/4	0 10 1/4	2 8 1/8	1 4 1/4	4 3	1 10 1/4	5 9 7/8
3/8	1 1 5/8	0 10 3/8	2 8 1/2	1 4 3/8	4 3 3/8	1 10 3/8	5 10 1/4
1/2	1 2 1/8	0 10 1/2	2 8 7/8	1 4 1/2	4 3 3/4	1 10 1/2	5 10 5/8
5/8	1 2 1/2	0 10 5/8	2 9 1/4	1 4 5/8	4 4 1/8	1 10 5/8	5 11
3/4	1 2 7/8	0 10 3/4	2 9 3/4	1 4 3/4	4 4 1/2	1 10 3/4	5 11 3/4
7/8	1 3 1/4	0 10 7/8	2 10 1/8	1 4 7/8	4 5	1 10 7/8	5 11 3/4
5.	1 3 5/8	0 11	2 10 1/2	1 5	4 5 3/8	1 11	6 0 1/8
1/8	1 4	0 11 1/8	2 10 7/8	1 5 1/8	4 5 3/4	1 11 1/8	6 0 5/8
1/4	1 4 3/8	0 11 1/4	2 11 1/4	1 5 1/4	4 6 1/8	1 11 1/4	6 1
3/8	1 4 7/8	0 11 3/8	2 11 5/8	1 5 3/8	4 6 1/2	1 11 3/8	6 1 3/8
1/2	1 5 1/4	0 11 1/2	3	1 5 1/2	4 6 7/8	1 11 1/2	6 1 7/8
5/8	1 5 5/8	0 11 5/8	3 0 1/8	1 5 5/8	4 7 1/4	1 11 5/8	6 2 1/4
3/4	1 6	0 11 3/4	3 0 1/2	1 5 3/4	4 7 3/4	1 11 3/4	6 2 1/2
7/8	1 6 3/8	0 11 7/8	3 0 7/8	1 5 7/8	4 8 1/8	1 11 7/8	6 3
6.	1 6 3/4	1	3 1 5/8	1 6	4 8 1/2	2	6 3 3/8
1/8	1 7 1/8	1 0 1/8	3 2	1 6 1/8	4 8 7/8	2 0 1/8	6 3 3/4
1/4	1 7 5/8	1 0 1/4	3 2 3/8	1 6 1/4	4 9 1/4	2 0 1/4	6 4 1/8
3/8	1 8	1 0 3/8	3 2 7/8	1 6 3/8	4 9 5/8	2 0 3/8	6 4 5/8
1/2	1 8 3/8	1 0 1/2	3 3 1/4	1 6 1/2	4 10	2 0 1/2	6 4 7/8
5/8	1 8 3/4	1 0 5/8	3 3 5/8	1 6 5/8	4 10 3/8	2 0 5/8	6 5 1/4
3/4	1 9 1/8	1 0 3/4	3 4	1 6 3/4	4 10 7/8	2 0 3/4	6 5 3/4
7/8	1 9 1/2	1 0 7/8	3 4 3/8	1 6 7/8	4 11 1/4	2 0 7/8	6 6 1/8

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
2	1	6	$6\frac{1}{8}$	2	8	8	$4\frac{1}{8}$	3	3	10	$2\frac{1}{8}$	3	10	12	$0\frac{1}{8}$
2	$1\frac{1}{8}$	6	$6\frac{3}{8}$	2	$8\frac{1}{8}$	8	$4\frac{3}{8}$	3	$3\frac{1}{8}$	10	$2\frac{3}{8}$	3	$10\frac{1}{8}$	12	$0\frac{3}{8}$
2	$1\frac{1}{4}$	6	$7\frac{1}{8}$	2	$8\frac{1}{4}$	8	$5\frac{1}{8}$	3	$3\frac{1}{4}$	10	$3\frac{1}{8}$	3	$10\frac{1}{4}$	12	$1\frac{1}{8}$
2	$1\frac{3}{8}$	6	$7\frac{3}{8}$	2	$8\frac{3}{8}$	8	$5\frac{3}{8}$	3	$3\frac{3}{8}$	10	$3\frac{3}{8}$	3	$10\frac{3}{8}$	12	$1\frac{3}{8}$
2	$1\frac{1}{2}$	6	8	2	$8\frac{1}{2}$	8	6	3	$3\frac{1}{2}$	10	4	3	$10\frac{1}{2}$	12	2
2	$1\frac{5}{8}$	6	$8\frac{1}{8}$	2	$8\frac{5}{8}$	8	$6\frac{1}{8}$	3	$3\frac{5}{8}$	10	$4\frac{1}{8}$	3	$10\frac{5}{8}$	12	$2\frac{1}{8}$
2	$1\frac{3}{4}$	6	$8\frac{3}{8}$	2	$8\frac{3}{4}$	8	$6\frac{3}{8}$	3	$3\frac{3}{4}$	10	$4\frac{3}{8}$	3	$10\frac{3}{4}$	12	$2\frac{3}{8}$
2	$1\frac{7}{8}$	6	$9\frac{1}{8}$	2	$8\frac{7}{8}$	8	$7\frac{1}{8}$	3	$3\frac{7}{8}$	10	$5\frac{1}{8}$	3	$10\frac{7}{8}$	12	$3\frac{1}{8}$
2	2	6	$9\frac{5}{8}$	2	9	8	$7\frac{5}{8}$	3	4	10	$5\frac{5}{8}$	3	11	12	$3\frac{5}{8}$
2	$2\frac{1}{8}$	6	$10\frac{1}{8}$	2	$9\frac{1}{8}$	8	8	3	$4\frac{1}{8}$	10	6	3	$11\frac{1}{8}$	12	4
2	$2\frac{1}{4}$	6	$10\frac{3}{8}$	2	$9\frac{1}{4}$	8	$8\frac{3}{8}$	3	$4\frac{1}{4}$	10	$6\frac{3}{8}$	3	$11\frac{1}{4}$	12	$4\frac{3}{8}$
2	$2\frac{3}{8}$	6	$10\frac{7}{8}$	2	$9\frac{3}{8}$	8	$8\frac{7}{8}$	3	$4\frac{3}{8}$	10	$6\frac{7}{8}$	3	$11\frac{3}{8}$	12	$4\frac{7}{8}$
2	$2\frac{1}{2}$	6	$11\frac{1}{4}$	2	$9\frac{1}{2}$	8	$9\frac{1}{4}$	3	$4\frac{1}{2}$	10	$7\frac{1}{8}$	3	$11\frac{1}{2}$	12	$5\frac{1}{8}$
2	$2\frac{5}{8}$	6	$11\frac{5}{8}$	2	$9\frac{5}{8}$	8	$9\frac{5}{8}$	3	$4\frac{5}{8}$	10	$7\frac{5}{8}$	3	$11\frac{5}{8}$	12	$5\frac{1}{2}$
2	$2\frac{3}{4}$	7		2	$9\frac{3}{4}$	8	10	3	$4\frac{3}{4}$	10	8	3	$11\frac{3}{4}$	12	6
2	$2\frac{7}{8}$	7	$0\frac{3}{8}$	2	$9\frac{7}{8}$	8	$10\frac{3}{8}$	3	$4\frac{7}{8}$	10	$8\frac{3}{8}$	3	$11\frac{7}{8}$	12	$6\frac{3}{8}$
2	3	7	$0\frac{1}{4}$	2	10	8	$10\frac{1}{4}$	3	5	10	$8\frac{1}{4}$	4		12	$6\frac{1}{4}$
2	$3\frac{1}{8}$	7	$1\frac{1}{8}$	2	$10\frac{1}{8}$	8	$11\frac{1}{8}$	3	$5\frac{1}{8}$	10	$9\frac{1}{8}$	4	$0\frac{1}{8}$	12	$7\frac{1}{8}$
2	$3\frac{1}{4}$	7	$1\frac{3}{8}$	2	$10\frac{1}{4}$	8	$11\frac{3}{8}$	3	$5\frac{1}{4}$	10	$9\frac{3}{8}$	4	$0\frac{1}{4}$	12	$7\frac{1}{2}$
2	$3\frac{3}{8}$	7	2	2	$10\frac{3}{8}$	8	$11\frac{7}{8}$	3	$5\frac{3}{8}$	10	$9\frac{7}{8}$	4	$0\frac{3}{8}$	12	$7\frac{7}{8}$
2	$3\frac{1}{2}$	7	$2\frac{3}{8}$	2	$10\frac{1}{2}$	9	$0\frac{3}{8}$	3	$5\frac{1}{2}$	10	$10\frac{3}{8}$	4	$0\frac{1}{2}$	12	$8\frac{1}{4}$
2	$3\frac{5}{8}$	7	$2\frac{3}{4}$	2	$10\frac{5}{8}$	9	$0\frac{3}{4}$	3	$5\frac{5}{8}$	10	$10\frac{3}{4}$	4	$0\frac{5}{8}$	12	$8\frac{3}{4}$
2	$3\frac{3}{4}$	7	$3\frac{1}{8}$	2	$10\frac{3}{4}$	9	$1\frac{1}{8}$	3	$5\frac{3}{4}$	10	$11\frac{1}{8}$	4	$0\frac{3}{4}$	12	$9\frac{1}{8}$
2	$3\frac{7}{8}$	7	$3\frac{1}{2}$	2	$10\frac{7}{8}$	9	$1\frac{1}{2}$	3	$5\frac{7}{8}$	10	$11\frac{1}{2}$	4	$0\frac{7}{8}$	12	$9\frac{1}{2}$
2	4	7	$3\frac{7}{8}$	2	11	9	$1\frac{7}{8}$	3	6	10	$11\frac{7}{8}$	4	1	12	$9\frac{7}{8}$
2	$4\frac{1}{8}$	7	$4\frac{1}{8}$	2	$11\frac{1}{8}$	9	$2\frac{1}{4}$	3	$6\frac{1}{8}$	11	$0\frac{1}{8}$	4	$1\frac{1}{8}$	12	$10\frac{1}{4}$
2	$4\frac{1}{4}$	7	$4\frac{3}{8}$	2	$11\frac{1}{4}$	9	$2\frac{3}{8}$	3	$6\frac{1}{4}$	11	$0\frac{3}{8}$	4	$1\frac{1}{4}$	12	$10\frac{3}{8}$
2	$4\frac{3}{8}$	7	$4\frac{7}{8}$	2	$11\frac{3}{8}$	9	3	3	$6\frac{3}{8}$	11	$1\frac{1}{8}$	4	$1\frac{3}{8}$	12	11
2	$4\frac{1}{2}$	7	$5\frac{1}{8}$	2	$11\frac{1}{2}$	9	$3\frac{1}{8}$	3	$6\frac{1}{2}$	11	$1\frac{1}{2}$	4	$1\frac{1}{2}$	12	$11\frac{1}{8}$
2	$4\frac{5}{8}$	7	$5\frac{3}{8}$	2	$11\frac{5}{8}$	9	$3\frac{3}{8}$	3	$6\frac{5}{8}$	11	$1\frac{5}{8}$	4	$1\frac{5}{8}$	12	$11\frac{7}{8}$
2	$4\frac{3}{4}$	7	$5\frac{7}{8}$	2	$11\frac{3}{4}$	9	$3\frac{7}{8}$	3	$6\frac{3}{4}$	11	$1\frac{3}{4}$	4	$1\frac{3}{4}$	13	$0\frac{1}{4}$
2	$4\frac{7}{8}$	7	$6\frac{1}{8}$	2	$11\frac{7}{8}$	9	$4\frac{1}{8}$	3	$6\frac{7}{8}$	11	$1\frac{7}{8}$	4	$1\frac{7}{8}$	13	$0\frac{3}{8}$
2	5	7	$6\frac{3}{8}$	3		9	$4\frac{3}{8}$	3	7	11	$2\frac{3}{8}$	4	2	13	1
2	$5\frac{1}{8}$	7	7	3	$0\frac{1}{8}$	9	5	3	$7\frac{1}{8}$	11	3	4	$2\frac{1}{8}$	13	$1\frac{1}{8}$
2	$5\frac{1}{4}$	7	$7\frac{1}{8}$	3	$0\frac{1}{4}$	9	$5\frac{1}{8}$	3	$7\frac{1}{4}$	11	$3\frac{1}{8}$	4	$2\frac{1}{4}$	13	$1\frac{1}{4}$
2	$5\frac{3}{8}$	7	$7\frac{3}{8}$	3	$0\frac{3}{8}$	9	$5\frac{3}{8}$	3	$7\frac{3}{8}$	11	$3\frac{3}{8}$	4	$2\frac{3}{8}$	13	$1\frac{3}{8}$
2	$5\frac{1}{2}$	7	$8\frac{1}{8}$	3	$0\frac{1}{2}$	9	$6\frac{1}{8}$	3	$7\frac{1}{2}$	11	$4\frac{1}{8}$	4	$2\frac{1}{2}$	13	$2\frac{1}{8}$
2	$5\frac{5}{8}$	7	$8\frac{3}{8}$	3	$0\frac{3}{8}$	9	$6\frac{3}{8}$	3	$7\frac{3}{8}$	11	$4\frac{3}{8}$	4	$2\frac{3}{8}$	13	$2\frac{3}{8}$
2	$5\frac{3}{4}$	7	9	3	$0\frac{3}{4}$	9	7	3	$7\frac{3}{4}$	11	5	4	$2\frac{1}{2}$	13	3
2	$5\frac{7}{8}$	7	$9\frac{3}{8}$	3	$0\frac{7}{8}$	9	$7\frac{3}{8}$	3	$7\frac{7}{8}$	11	$5\frac{3}{8}$	4	$2\frac{5}{8}$	13	$3\frac{3}{8}$
2	6	7	$9\frac{7}{8}$	3	1	9	$7\frac{7}{8}$	3	8	11	$5\frac{7}{8}$	4	$2\frac{3}{4}$	13	$3\frac{3}{4}$
2	$6\frac{1}{8}$	7	$10\frac{1}{8}$	3	$1\frac{1}{8}$	9	$8\frac{1}{8}$	3	$8\frac{1}{8}$	11	$6\frac{1}{8}$	4	3	13	$4\frac{1}{8}$
2	$6\frac{1}{4}$	7	$10\frac{3}{8}$	3	$1\frac{1}{4}$	9	$8\frac{3}{8}$	3	$8\frac{1}{4}$	11	$6\frac{1}{2}$	4	$3\frac{1}{8}$	13	$4\frac{1}{2}$
2	$6\frac{3}{8}$	7	11	3	$1\frac{3}{8}$	9	9	3	$8\frac{3}{8}$	11	7	4	$3\frac{1}{4}$	13	5
2	$6\frac{1}{2}$	7	$11\frac{3}{8}$	3	$1\frac{1}{2}$	9	$9\frac{1}{8}$	3	$8\frac{1}{2}$	11	$7\frac{1}{8}$	4	$3\frac{3}{8}$	13	$5\frac{1}{8}$
2	$6\frac{5}{8}$	7	$11\frac{1}{2}$	3	$1\frac{5}{8}$	9	$9\frac{1}{4}$	3	$8\frac{5}{8}$	11	$7\frac{1}{4}$	4	$3\frac{1}{2}$	13	$5\frac{1}{4}$
2	$6\frac{3}{4}$	8	$0\frac{1}{8}$	3	$1\frac{3}{4}$	9	$10\frac{1}{8}$	3	$8\frac{3}{4}$	11	$8\frac{1}{8}$	4	$3\frac{5}{8}$	13	$6\frac{1}{8}$
2	$6\frac{7}{8}$	8	$0\frac{1}{4}$	3	$1\frac{7}{8}$	9	$10\frac{1}{4}$	3	$8\frac{7}{8}$	11	$8\frac{1}{4}$	4	$3\frac{3}{4}$	13	$6\frac{1}{4}$
2	7	8	$0\frac{3}{8}$	3	2	9	$10\frac{3}{8}$	3	9	11	$9\frac{1}{8}$	4	4	13	$6\frac{3}{8}$
2	$7\frac{1}{8}$	8	$1\frac{1}{8}$	3	$2\frac{1}{8}$	9	$11\frac{1}{8}$	3	$9\frac{1}{8}$	11	$9\frac{1}{4}$	4	$4\frac{1}{8}$	13	$7\frac{1}{4}$
2	$7\frac{1}{4}$	8	$1\frac{3}{8}$	3	$2\frac{1}{4}$	9	$11\frac{3}{8}$	3	$9\frac{1}{4}$	11	$9\frac{3}{8}$	4	$4\frac{1}{4}$	13	$7\frac{3}{8}$
2	$7\frac{3}{8}$	8	$1\frac{5}{8}$	3	$2\frac{3}{8}$	9	$11\frac{5}{8}$	3	$9\frac{3}{8}$	11	$9\frac{5}{8}$	4	$4\frac{3}{8}$	13	$7\frac{5}{8}$
2	$7\frac{1}{2}$	8	$1\frac{7}{8}$	3	$2\frac{1}{2}$	9	$11\frac{7}{8}$	3	$9\frac{1}{2}$	11	$9\frac{7}{8}$	4	$4\frac{1}{2}$	13	$7\frac{7}{8}$
2	$7\frac{5}{8}$	8	$2\frac{1}{8}$	3	$2\frac{5}{8}$	10	$0\frac{1}{8}$	3	$9\frac{5}{8}$	11	$10\frac{1}{8}$	4	$4\frac{5}{8}$	13	$8\frac{1}{8}$
2	$7\frac{3}{4}$	8	$2\frac{3}{8}$	3	$2\frac{3}{4}$	10	$0\frac{3}{8}$	3	$9\frac{3}{4}$	11	$10\frac{3}{8}$	4	$4\frac{3}{4}$	13	$8\frac{3}{8}$
2	$7\frac{7}{8}$	8	$2\frac{5}{8}$	3	$2\frac{7}{8}$	10	$0\frac{5}{8}$	3	$9\frac{7}{8}$	11	$10\frac{5}{8}$	4	$4\frac{7}{8}$	13	$8\frac{5}{8}$
2	$7\frac{7}{8}$	8	$2\frac{7}{8}$	3	$2\frac{7}{8}$	10	$0\frac{7}{8}$	3	$9\frac{7}{8}$	11	$10\frac{7}{8}$	4	$4\frac{7}{8}$	13	$8\frac{7}{8}$
2	$7\frac{7}{8}$	8	$3\frac{1}{8}$	3	$2\frac{7}{8}$	10	$1\frac{1}{8}$	3	$9\frac{7}{8}$	11	$11\frac{1}{8}$	4	$4\frac{7}{8}$	13	$9\frac{1}{8}$
2	$7\frac{7}{8}$	8	$3\frac{3}{8}$	3	$2\frac{7}{8}$	10	$1\frac{3}{8}$	3	$9\frac{7}{8}$	11	$11\frac{3}{8}$	4	$4\frac{7}{8}$	13	$9\frac{3}{8}$
2	$7\frac{7}{8}$	8	$4\frac{3}{8}$	3	$2\frac{7}{8}$	10	$2\frac{1}{8}$	3	$9\frac{7}{8}$	12		4	$4\frac{7}{8}$	13	10

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
4	5	13	$10\frac{1}{2}$	5		15	$8\frac{3}{8}$	5	7	17	$6\frac{3}{8}$	6	2	19	$4\frac{3}{8}$
4	$5\frac{1}{8}$	13	$10\frac{7}{8}$	5	$0\frac{1}{8}$	15	$8\frac{7}{8}$	5	$7\frac{1}{8}$	17	$6\frac{7}{8}$	6	$2\frac{1}{8}$	19	$4\frac{7}{8}$
4	$5\frac{1}{4}$	13	$11\frac{1}{4}$	5	$0\frac{1}{4}$	15	$9\frac{1}{4}$	5	$7\frac{1}{4}$	17	$7\frac{1}{4}$	6	$2\frac{1}{4}$	19	$5\frac{1}{4}$
4	$5\frac{3}{8}$	13	$11\frac{5}{8}$	5	$0\frac{3}{8}$	15	$9\frac{5}{8}$	5	$7\frac{3}{8}$	17	$7\frac{5}{8}$	6	$2\frac{3}{8}$	19	$5\frac{5}{8}$
4	$5\frac{1}{2}$	14		5	$0\frac{1}{2}$	15	10	5	$7\frac{1}{2}$	17	8	6	$2\frac{1}{2}$	19	6
4	$5\frac{5}{8}$	14	$0\frac{3}{8}$	5	$0\frac{5}{8}$	15	$10\frac{3}{8}$	5	$7\frac{5}{8}$	17	$8\frac{3}{8}$	6	$2\frac{5}{8}$	19	$6\frac{3}{8}$
4	$5\frac{3}{4}$	14	$0\frac{3}{4}$	5	$0\frac{3}{4}$	15	$10\frac{3}{4}$	5	$7\frac{3}{4}$	17	$8\frac{3}{4}$	6	$2\frac{3}{4}$	19	$6\frac{3}{4}$
4	$5\frac{7}{8}$	14	$1\frac{1}{8}$	5	$0\frac{7}{8}$	15	$11\frac{1}{8}$	5	$7\frac{7}{8}$	17	$9\frac{1}{8}$	6	$2\frac{7}{8}$	19	$7\frac{1}{8}$
4	6	14	$1\frac{3}{8}$	5	1	15	$11\frac{5}{8}$	5	8	17	$9\frac{5}{8}$	6	3	19	$7\frac{1}{2}$
4	$6\frac{1}{8}$	14	2	5	$1\frac{1}{8}$	16		5	$8\frac{1}{8}$	17	10	6	$3\frac{1}{8}$	19	8
4	$6\frac{1}{4}$	14	$2\frac{3}{8}$	5	$1\frac{1}{4}$	16	$0\frac{3}{8}$	5	$8\frac{1}{4}$	17	$10\frac{3}{8}$	6	$3\frac{1}{4}$	19	$8\frac{3}{8}$
4	$6\frac{3}{8}$	14	$2\frac{7}{8}$	5	$1\frac{3}{8}$	16	$0\frac{7}{8}$	5	$8\frac{3}{8}$	17	$10\frac{7}{8}$	6	$3\frac{3}{8}$	19	$8\frac{7}{8}$
4	$6\frac{1}{2}$	14	$3\frac{1}{2}$	5	$1\frac{1}{2}$	16	$1\frac{1}{8}$	5	$8\frac{1}{2}$	17	$11\frac{1}{8}$	6	$3\frac{1}{2}$	19	$9\frac{1}{8}$
4	$6\frac{5}{8}$	14	$3\frac{1}{2}$	5	$1\frac{5}{8}$	16	$1\frac{1}{2}$	5	$8\frac{5}{8}$	17	$11\frac{1}{2}$	6	$3\frac{5}{8}$	19	$9\frac{1}{2}$
4	$6\frac{3}{4}$	14	4	5	$1\frac{3}{4}$	16	$1\frac{7}{8}$	5	$8\frac{3}{4}$	17	$11\frac{7}{8}$	6	$3\frac{3}{4}$	19	$9\frac{7}{8}$
4	$6\frac{7}{8}$	14	$4\frac{3}{8}$	5	$1\frac{7}{8}$	16	$2\frac{3}{8}$	5	$8\frac{7}{8}$	18	$0\frac{3}{8}$	6	$3\frac{7}{8}$	19	$10\frac{1}{4}$
4	7	14	$4\frac{3}{4}$	5	2	16	$2\frac{3}{4}$	5	9	18	$0\frac{3}{4}$	6	4	19	$10\frac{3}{4}$
4	$7\frac{1}{8}$	14	$5\frac{1}{8}$	5	$2\frac{1}{8}$	16	$3\frac{1}{8}$	5	$9\frac{1}{8}$	18	$1\frac{1}{8}$	6	$4\frac{1}{8}$	19	$11\frac{1}{8}$
4	$7\frac{1}{4}$	14	$5\frac{1}{4}$	5	$2\frac{1}{4}$	16	$3\frac{1}{4}$	5	$9\frac{1}{4}$	18	$1\frac{1}{4}$	6	$4\frac{1}{4}$	19	$11\frac{1}{4}$
4	$7\frac{3}{8}$	14	$5\frac{7}{8}$	5	$2\frac{3}{8}$	16	$3\frac{7}{8}$	5	$9\frac{3}{8}$	18	$1\frac{7}{8}$	6	$4\frac{3}{8}$	19	$11\frac{7}{8}$
4	$7\frac{1}{2}$	14	$6\frac{1}{2}$	5	$2\frac{1}{2}$	16	$4\frac{1}{4}$	5	$9\frac{1}{2}$	18	$2\frac{1}{4}$	6	$4\frac{1}{2}$	20	$0\frac{1}{4}$
4	$7\frac{5}{8}$	14	$6\frac{3}{4}$	5	$2\frac{5}{8}$	16	$4\frac{5}{8}$	5	$9\frac{5}{8}$	18	$2\frac{5}{8}$	6	$4\frac{5}{8}$	20	$0\frac{5}{8}$
4	$7\frac{3}{4}$	14	$7\frac{1}{8}$	5	$2\frac{3}{4}$	16	$5\frac{1}{8}$	5	$9\frac{3}{4}$	18	3	6	$4\frac{3}{4}$	20	1
4	$7\frac{7}{8}$	14	$7\frac{1}{2}$	5	$2\frac{7}{8}$	16	$5\frac{1}{2}$	5	$9\frac{7}{8}$	18	$3\frac{1}{2}$	6	$4\frac{7}{8}$	20	$1\frac{1}{2}$
4	8	14	$7\frac{7}{8}$	5	3	16	$5\frac{7}{8}$	5	10	18	$3\frac{7}{8}$	6	5	20	$1\frac{7}{8}$
4	$8\frac{1}{8}$	14	$8\frac{1}{8}$	5	$3\frac{1}{8}$	16	$6\frac{1}{4}$	5	$10\frac{1}{8}$	18	$4\frac{1}{4}$	6	$5\frac{1}{8}$	20	$2\frac{1}{4}$
4	$8\frac{1}{4}$	14	$8\frac{1}{2}$	5	$3\frac{1}{4}$	16	$6\frac{5}{8}$	5	$10\frac{1}{4}$	18	$4\frac{5}{8}$	6	$5\frac{1}{4}$	20	$2\frac{5}{8}$
4	$8\frac{3}{8}$	14	9	5	$3\frac{3}{8}$	16	7	5	$10\frac{3}{8}$	18	5	6	$5\frac{3}{8}$	20	3
4	$8\frac{1}{2}$	14	$9\frac{1}{2}$	5	$3\frac{1}{2}$	16	$7\frac{3}{8}$	5	$10\frac{1}{2}$	18	$5\frac{3}{8}$	6	$5\frac{1}{2}$	20	$3\frac{3}{8}$
4	$8\frac{5}{8}$	14	$9\frac{7}{8}$	5	$3\frac{5}{8}$	16	$7\frac{7}{8}$	5	$10\frac{5}{8}$	18	$5\frac{7}{8}$	6	$5\frac{5}{8}$	20	$3\frac{7}{8}$
4	$8\frac{3}{4}$	14	$10\frac{1}{4}$	5	$3\frac{3}{4}$	16	$8\frac{1}{4}$	5	$10\frac{3}{4}$	18	$6\frac{1}{4}$	6	$5\frac{3}{4}$	20	$4\frac{1}{4}$
4	$8\frac{7}{8}$	14	$10\frac{5}{8}$	5	$3\frac{7}{8}$	16	$8\frac{5}{8}$	5	$10\frac{7}{8}$	18	$6\frac{5}{8}$	6	$5\frac{7}{8}$	20	$4\frac{5}{8}$
4	9	14	11	5	4	16	9	5	11	18	7	6	6	20	5
4	$9\frac{1}{8}$	14	$11\frac{3}{8}$	5	$4\frac{1}{8}$	16	$9\frac{3}{8}$	5	$11\frac{1}{8}$	18	$7\frac{3}{8}$	6	$6\frac{1}{8}$	20	$5\frac{3}{8}$
4	$9\frac{1}{4}$	14	$11\frac{7}{8}$	5	$4\frac{1}{4}$	16	$9\frac{7}{8}$	5	$11\frac{1}{4}$	18	$7\frac{7}{8}$	6	$6\frac{1}{4}$	20	$5\frac{7}{8}$
4	$9\frac{3}{8}$	15	$0\frac{1}{8}$	5	$4\frac{3}{8}$	16	$10\frac{1}{8}$	5	$11\frac{3}{8}$	18	$8\frac{1}{8}$	6	$6\frac{3}{8}$	20	$6\frac{1}{8}$
4	$9\frac{1}{2}$	15	$0\frac{1}{8}$	5	$4\frac{1}{2}$	16	$10\frac{5}{8}$	5	$11\frac{1}{2}$	18	$8\frac{1}{2}$	6	$6\frac{1}{2}$	20	$6\frac{1}{2}$
4	$9\frac{5}{8}$	15	1	5	$4\frac{3}{8}$	16	11	5	$11\frac{5}{8}$	18	9	6	$6\frac{5}{8}$	20	7
4	$9\frac{1}{4}$	15	$1\frac{3}{8}$	5	$4\frac{1}{4}$	16	$11\frac{3}{8}$	5	$11\frac{1}{4}$	18	$9\frac{3}{8}$	6	$6\frac{3}{4}$	20	$7\frac{3}{8}$
4	$9\frac{7}{8}$	15	$1\frac{1}{4}$	5	$4\frac{7}{8}$	16	$11\frac{3}{4}$	5	$11\frac{7}{8}$	18	$9\frac{1}{4}$	6	$6\frac{7}{8}$	20	$7\frac{1}{4}$
4	10	15	$2\frac{1}{8}$	5	5	17	$0\frac{1}{8}$	6		18	$10\frac{1}{4}$	6	7	20	$8\frac{1}{8}$
4	$10\frac{1}{8}$	15	$2\frac{1}{4}$	5	$5\frac{1}{8}$	17	$0\frac{3}{8}$	6	$0\frac{1}{8}$	18	$10\frac{1}{4}$	6	$7\frac{1}{8}$	20	$8\frac{1}{4}$
4	$10\frac{1}{4}$	15	$2\frac{7}{8}$	5	$5\frac{1}{4}$	17	1	6	$0\frac{1}{4}$	18	$10\frac{7}{8}$	6	$7\frac{1}{4}$	20	$8\frac{7}{8}$
4	$10\frac{3}{8}$	15	$3\frac{3}{8}$	5	$5\frac{3}{8}$	17	$1\frac{3}{8}$	6	$0\frac{3}{8}$	18	$11\frac{1}{4}$	6	$7\frac{3}{8}$	20	$9\frac{1}{4}$
4	$10\frac{1}{2}$	15	$3\frac{1}{2}$	5	$5\frac{1}{2}$	17	$1\frac{1}{2}$	6	$0\frac{1}{2}$	18	$11\frac{1}{2}$	6	$7\frac{1}{2}$	20	$9\frac{1}{2}$
4	$10\frac{5}{8}$	15	$4\frac{1}{8}$	5	$5\frac{5}{8}$	17	$2\frac{1}{8}$	6	$0\frac{5}{8}$	19	$0\frac{1}{8}$	6	$7\frac{5}{8}$	20	$10\frac{1}{4}$
4	$10\frac{1}{4}$	15	$4\frac{1}{2}$	5	$5\frac{1}{4}$	17	$2\frac{1}{2}$	6	$0\frac{3}{4}$	19	$0\frac{1}{4}$	6	$7\frac{1}{4}$	20	$10\frac{1}{2}$
4	$10\frac{7}{8}$	15	$4\frac{7}{8}$	5	$5\frac{7}{8}$	17	$2\frac{7}{8}$	6	$0\frac{7}{8}$	19	$0\frac{7}{8}$	6	$7\frac{7}{8}$	20	$10\frac{7}{8}$
4	11	15	$5\frac{1}{4}$	5	6	17	$3\frac{1}{4}$	6	1	19	$1\frac{1}{4}$	6	8	20	$11\frac{1}{4}$
4	$11\frac{1}{8}$	15	$5\frac{5}{8}$	5	$6\frac{1}{8}$	17	$3\frac{5}{8}$	6	$1\frac{1}{8}$	19	$1\frac{5}{8}$	6	$8\frac{1}{8}$	20	$11\frac{5}{8}$
4	$11\frac{1}{4}$	15	$6\frac{1}{8}$	5	$6\frac{1}{4}$	17	$4\frac{1}{8}$	6	$1\frac{1}{4}$	19	2	6	$8\frac{1}{4}$	21	0
4	$11\frac{3}{8}$	15	$6\frac{3}{8}$	5	$6\frac{3}{8}$	17	$4\frac{3}{8}$	6	$1\frac{3}{8}$	19	$2\frac{1}{4}$	6	$8\frac{3}{8}$	21	$0\frac{3}{8}$
4	$11\frac{1}{2}$	15	$6\frac{7}{8}$	5	$6\frac{1}{2}$	17	$4\frac{7}{8}$	6	$1\frac{1}{2}$	19	$2\frac{7}{8}$	6	$8\frac{1}{2}$	21	$0\frac{7}{8}$
4	$11\frac{5}{8}$	15	$7\frac{1}{8}$	5	$6\frac{5}{8}$	17	$5\frac{1}{8}$	6	$1\frac{5}{8}$	19	$3\frac{1}{4}$	6	$8\frac{5}{8}$	21	$1\frac{1}{4}$
4	$11\frac{3}{4}$	15	$7\frac{5}{8}$	5	$6\frac{3}{4}$	17	$5\frac{5}{8}$	6	$1\frac{3}{4}$	19	$3\frac{5}{8}$	6	$8\frac{3}{4}$	21	$1\frac{5}{8}$
4	$11\frac{7}{8}$	15	8	5	$6\frac{7}{8}$	17	6	6	$1\frac{7}{8}$	19	4	6	$8\frac{7}{8}$	21	2

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
6	9	21	$2\frac{3}{8}$	7	4	23	$0\frac{3}{8}$	7	11	24	$10\frac{3}{8}$	8	6	26	$8\frac{3}{8}$
6	$9\frac{1}{8}$	21	$2\frac{5}{8}$	7	$4\frac{1}{8}$	23	$0\frac{5}{8}$	7	$11\frac{1}{8}$	24	$10\frac{5}{8}$	8	$6\frac{1}{8}$	26	$8\frac{5}{8}$
6	$9\frac{1}{4}$	21	$3\frac{1}{4}$	7	$4\frac{1}{4}$	23	$1\frac{1}{4}$	7	$11\frac{1}{4}$	24	$11\frac{1}{4}$	8	$6\frac{1}{4}$	26	$9\frac{1}{4}$
6	$9\frac{3}{8}$	21	$3\frac{5}{8}$	7	$4\frac{3}{8}$	23	$1\frac{3}{8}$	7	$11\frac{3}{8}$	24	$11\frac{3}{8}$	8	$6\frac{3}{8}$	26	$9\frac{3}{8}$
6	$9\frac{1}{2}$	21	4	7	$4\frac{1}{2}$	23	2	7	$11\frac{1}{2}$	24	$11\frac{1}{2}$	8	$6\frac{1}{2}$	26	10
6	$9\frac{5}{8}$	21	$4\frac{3}{8}$	7	$4\frac{5}{8}$	23	$2\frac{3}{8}$	7	$11\frac{5}{8}$	25	$0\frac{3}{8}$	8	$6\frac{5}{8}$	26	$10\frac{3}{8}$
6	$9\frac{3}{4}$	21	$4\frac{3}{4}$	7	$4\frac{3}{4}$	23	$2\frac{3}{4}$	7	$11\frac{3}{4}$	25	$0\frac{3}{4}$	8	$6\frac{3}{4}$	26	$10\frac{3}{4}$
6	$9\frac{7}{8}$	21	$5\frac{1}{8}$	7	$4\frac{7}{8}$	23	$3\frac{1}{8}$	7	$11\frac{7}{8}$	25	$1\frac{1}{8}$	8	$6\frac{7}{8}$	26	$11\frac{1}{8}$
6	10	21	$5\frac{1}{2}$	7	5	23	$3\frac{1}{2}$	8		25	$1\frac{1}{2}$	8	7	26	$11\frac{1}{2}$
6	$10\frac{1}{8}$	21	6	7	$5\frac{1}{8}$	23	$3\frac{5}{8}$	8	$0\frac{1}{8}$	25	$1\frac{5}{8}$	8	$7\frac{1}{8}$	26	$11\frac{5}{8}$
6	$10\frac{1}{4}$	21	$6\frac{3}{8}$	7	$5\frac{1}{4}$	23	$4\frac{1}{4}$	8	$0\frac{1}{4}$	25	$2\frac{1}{4}$	8	$7\frac{1}{4}$	27	0
6	$10\frac{3}{8}$	21	$6\frac{3}{4}$	7	$5\frac{3}{8}$	23	$4\frac{3}{4}$	8	$0\frac{3}{8}$	25	$2\frac{3}{4}$	8	$7\frac{3}{8}$	27	$0\frac{1}{4}$
6	$10\frac{1}{2}$	21	$7\frac{1}{8}$	7	$5\frac{1}{2}$	23	$5\frac{1}{8}$	8	$0\frac{1}{2}$	25	$3\frac{1}{8}$	8	$7\frac{1}{2}$	27	$1\frac{1}{8}$
6	$10\frac{5}{8}$	21	$7\frac{1}{2}$	7	$5\frac{5}{8}$	23	$5\frac{1}{2}$	8	$0\frac{5}{8}$	25	$3\frac{1}{2}$	8	$7\frac{5}{8}$	27	$1\frac{1}{2}$
6	$10\frac{3}{4}$	21	$7\frac{7}{8}$	7	$5\frac{3}{4}$	23	$5\frac{7}{8}$	8	$0\frac{3}{4}$	25	$3\frac{7}{8}$	8	$7\frac{3}{4}$	27	$1\frac{7}{8}$
6	$10\frac{7}{8}$	21	$8\frac{1}{4}$	7	$5\frac{7}{8}$	23	$6\frac{1}{4}$	8	$0\frac{7}{8}$	25	$4\frac{1}{4}$	8	$7\frac{7}{8}$	27	$2\frac{1}{4}$
6	11	21	$8\frac{3}{4}$	7	6	23	$6\frac{5}{8}$	8	1	25	$4\frac{5}{8}$	8	8	27	$2\frac{5}{8}$
6	$11\frac{1}{8}$	21	$9\frac{1}{8}$	7	$6\frac{1}{8}$	23	$7\frac{1}{8}$	8	$1\frac{1}{8}$	25	$5\frac{1}{8}$	8	$8\frac{1}{8}$	27	3
6	$11\frac{1}{4}$	21	$9\frac{1}{2}$	7	$6\frac{1}{4}$	23	$7\frac{1}{2}$	8	$1\frac{1}{4}$	25	$5\frac{1}{2}$	8	$8\frac{1}{4}$	27	$3\frac{1}{2}$
6	$11\frac{3}{8}$	21	$9\frac{7}{8}$	7	$6\frac{3}{8}$	23	$7\frac{7}{8}$	8	$1\frac{3}{8}$	25	$5\frac{7}{8}$	8	$8\frac{3}{8}$	27	$3\frac{7}{8}$
6	$11\frac{1}{2}$	21	$10\frac{1}{4}$	7	$6\frac{1}{2}$	23	$8\frac{1}{4}$	8	$1\frac{1}{2}$	25	$6\frac{1}{4}$	8	$8\frac{1}{2}$	27	$4\frac{1}{4}$
6	$11\frac{5}{8}$	21	$10\frac{3}{4}$	7	$6\frac{5}{8}$	23	$8\frac{5}{8}$	8	$1\frac{5}{8}$	25	$6\frac{5}{8}$	8	$8\frac{5}{8}$	27	$4\frac{5}{8}$
6	$11\frac{3}{4}$	21	11	7	$6\frac{3}{4}$	23	9	8	$1\frac{3}{4}$	25	7	8	$8\frac{3}{4}$	27	5
6	$11\frac{7}{8}$	21	$11\frac{1}{4}$	7	$6\frac{7}{8}$	23	$9\frac{3}{8}$	8	$1\frac{7}{8}$	25	$7\frac{3}{8}$	8	$8\frac{7}{8}$	27	$5\frac{3}{8}$
7		21	$11\frac{7}{8}$	7	7	23	$9\frac{7}{8}$	8	2	25	$7\frac{7}{8}$	8	9	27	$5\frac{7}{8}$
7	$0\frac{1}{8}$	22	$0\frac{1}{8}$	7	$7\frac{1}{8}$	23	$10\frac{1}{8}$	8	$2\frac{1}{8}$	25	$8\frac{1}{8}$	8	$9\frac{1}{8}$	27	$6\frac{1}{8}$
7	$0\frac{1}{4}$	22	$0\frac{3}{8}$	7	$7\frac{1}{4}$	23	$10\frac{3}{8}$	8	$2\frac{1}{4}$	25	$8\frac{3}{8}$	8	$9\frac{1}{4}$	27	$6\frac{3}{8}$
7	$0\frac{3}{8}$	22	1	7	$7\frac{3}{8}$	23	11	8	$2\frac{3}{8}$	25	9	8	$9\frac{3}{8}$	27	7
7	$0\frac{1}{2}$	22	$1\frac{3}{8}$	7	$7\frac{1}{2}$	23	$11\frac{3}{8}$	8	$2\frac{1}{2}$	25	$9\frac{3}{8}$	8	$9\frac{1}{2}$	27	$7\frac{3}{8}$
7	$0\frac{5}{8}$	22	$1\frac{7}{8}$	7	$7\frac{5}{8}$	23	$11\frac{3}{4}$	8	$2\frac{5}{8}$	25	$9\frac{3}{8}$	8	$9\frac{5}{8}$	27	$7\frac{7}{8}$
7	$0\frac{3}{4}$	22	$2\frac{3}{8}$	7	$7\frac{3}{4}$	24	$0\frac{3}{8}$	8	$2\frac{3}{4}$	25	$10\frac{3}{8}$	8	$9\frac{3}{4}$	27	$8\frac{3}{8}$
7	$0\frac{7}{8}$	22	$2\frac{5}{8}$	7	$7\frac{7}{8}$	24	$0\frac{5}{8}$	8	$2\frac{7}{8}$	25	$10\frac{1}{2}$	8	$9\frac{7}{8}$	27	$8\frac{1}{2}$
7	1	22	3	7	8	24	1	8	3	25	11	8	10	27	9
7	$1\frac{1}{8}$	22	$3\frac{3}{8}$	7	$8\frac{1}{8}$	24	$1\frac{3}{8}$	8	$3\frac{1}{8}$	25	$11\frac{3}{8}$	8	$10\frac{1}{8}$	27	$9\frac{3}{8}$
7	$1\frac{1}{4}$	22	$3\frac{3}{4}$	7	$8\frac{1}{4}$	24	$1\frac{3}{4}$	8	$3\frac{1}{4}$	25	$11\frac{3}{4}$	8	$10\frac{1}{4}$	27	$9\frac{3}{4}$
7	$1\frac{3}{8}$	22	$4\frac{1}{8}$	7	$8\frac{3}{8}$	24	$2\frac{1}{8}$	8	$3\frac{3}{8}$	26	$0\frac{1}{8}$	8	$10\frac{3}{8}$	27	$10\frac{1}{8}$
7	$1\frac{1}{2}$	22	$4\frac{1}{2}$	7	$8\frac{1}{2}$	24	$2\frac{1}{2}$	8	$3\frac{1}{2}$	26	$0\frac{1}{4}$	8	$10\frac{1}{2}$	27	$10\frac{1}{2}$
7	$1\frac{5}{8}$	22	5	7	$8\frac{5}{8}$	24	$2\frac{5}{8}$	8	$3\frac{5}{8}$	26	$0\frac{3}{8}$	8	$10\frac{5}{8}$	27	$10\frac{5}{8}$
7	$1\frac{3}{4}$	22	$5\frac{3}{8}$	7	$8\frac{3}{4}$	24	$2\frac{3}{4}$	8	$3\frac{3}{4}$	26	$0\frac{1}{2}$	8	$10\frac{3}{4}$	27	$11\frac{1}{4}$
7	$1\frac{7}{8}$	22	$5\frac{7}{8}$	7	$8\frac{7}{8}$	24	$3\frac{3}{8}$	8	$3\frac{7}{8}$	26	$1\frac{3}{4}$	8	$10\frac{7}{8}$	27	$11\frac{7}{8}$
7	2	22	$6\frac{1}{8}$	7	9	24	$4\frac{1}{8}$	8	4	26	$2\frac{1}{8}$	8	11	28	$0\frac{1}{4}$
7	$2\frac{1}{8}$	22	$6\frac{3}{4}$	7	$9\frac{1}{8}$	24	$4\frac{1}{4}$	8	$4\frac{1}{8}$	26	$2\frac{1}{4}$	8	$11\frac{1}{8}$	28	$0\frac{1}{2}$
7	$2\frac{1}{4}$	22	$6\frac{7}{8}$	7	$9\frac{1}{4}$	24	$4\frac{3}{4}$	8	$4\frac{1}{4}$	26	$2\frac{3}{4}$	8	$11\frac{1}{4}$	28	$0\frac{3}{4}$
7	$2\frac{3}{8}$	22	$7\frac{1}{4}$	7	$9\frac{3}{8}$	24	$5\frac{1}{4}$	8	$4\frac{3}{8}$	26	$3\frac{1}{4}$	8	$11\frac{3}{8}$	28	$1\frac{1}{4}$
7	$2\frac{1}{2}$	22	$7\frac{5}{8}$	7	$9\frac{1}{2}$	24	$5\frac{5}{8}$	8	$4\frac{1}{2}$	26	$3\frac{5}{8}$	8	$11\frac{1}{2}$	28	$1\frac{5}{8}$
7	$2\frac{5}{8}$	22	$8\frac{1}{4}$	7	$9\frac{5}{8}$	24	$6\frac{1}{4}$	8	$4\frac{5}{8}$	26	$4\frac{1}{4}$	8	$11\frac{5}{8}$	28	2
7	$2\frac{3}{4}$	22	$8\frac{1}{2}$	7	$9\frac{3}{4}$	24	$6\frac{1}{2}$	8	$4\frac{3}{4}$	26	$4\frac{3}{4}$	8	$11\frac{3}{4}$	28	$2\frac{1}{4}$
7	$2\frac{7}{8}$	22	$8\frac{5}{8}$	7	$9\frac{7}{8}$	24	$6\frac{5}{8}$	8	$4\frac{7}{8}$	26	$4\frac{7}{8}$	8	$11\frac{7}{8}$	28	$2\frac{7}{8}$
7	3	22	$9\frac{1}{4}$	7	10	24	$7\frac{1}{4}$	8	5	26	$5\frac{1}{4}$	9		28	$3\frac{1}{4}$
7	$3\frac{1}{8}$	22	$9\frac{3}{4}$	7	$10\frac{1}{8}$	24	$7\frac{5}{8}$	8	$5\frac{1}{8}$	26	$5\frac{5}{8}$	9	$0\frac{1}{8}$	28	$3\frac{5}{8}$
7	$3\frac{1}{4}$	22	10	7	$10\frac{1}{4}$	24	8	8	$5\frac{1}{4}$	26	6	9	$0\frac{1}{4}$	28	4
7	$3\frac{3}{8}$	22	$10\frac{3}{8}$	7	$10\frac{3}{8}$	24	$8\frac{3}{8}$	8	$5\frac{3}{8}$	26	$6\frac{3}{8}$	9	$0\frac{3}{8}$	28	$4\frac{3}{8}$
7	$3\frac{1}{2}$	22	$10\frac{3}{4}$	7	$10\frac{1}{2}$	24	$8\frac{7}{8}$	8	$5\frac{1}{2}$	26	$6\frac{3}{4}$	9	$0\frac{1}{2}$	28	$4\frac{3}{4}$
7	$3\frac{5}{8}$	22	$11\frac{1}{4}$	7	$10\frac{5}{8}$	24	$9\frac{1}{4}$	8	$5\frac{5}{8}$	26	$7\frac{1}{4}$	9	$0\frac{5}{8}$	28	$5\frac{1}{4}$
7	$3\frac{3}{4}$	22	$11\frac{3}{4}$	7	$10\frac{3}{4}$	24	$9\frac{5}{8}$	8	$5\frac{3}{4}$	26	$7\frac{5}{8}$	9	$0\frac{3}{4}$	28	$5\frac{5}{8}$
7	$3\frac{7}{8}$	23	0	7	$10\frac{7}{8}$	24	10	8	$5\frac{7}{8}$	26	8	9	$0\frac{7}{8}$	28	6

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
9	1	28	$6\frac{3}{8}$	9	8	30	$4\frac{3}{8}$	10	3	32	$2\frac{3}{8}$	10	10	34	$0\frac{3}{8}$
9	$1\frac{1}{8}$	28	$6\frac{3}{4}$	9	$8\frac{1}{8}$	30	$4\frac{3}{4}$	10	$3\frac{1}{8}$	32	$2\frac{3}{4}$	10	$10\frac{1}{8}$	34	$0\frac{3}{4}$
9	$1\frac{1}{4}$	28	$7\frac{1}{8}$	9	$8\frac{1}{4}$	30	$5\frac{1}{8}$	10	$3\frac{1}{4}$	32	$3\frac{1}{8}$	10	$10\frac{1}{4}$	34	$1\frac{1}{8}$
9	$1\frac{3}{8}$	28	$7\frac{1}{2}$	9	$8\frac{3}{8}$	30	$5\frac{1}{2}$	10	$3\frac{3}{8}$	32	$3\frac{1}{2}$	10	$10\frac{3}{8}$	34	$1\frac{1}{2}$
9	$1\frac{1}{2}$	28	8	9	$8\frac{1}{2}$	30	6	10	$3\frac{1}{2}$	32	$3\frac{3}{4}$	10	$10\frac{1}{2}$	34	$1\frac{3}{4}$
9	$1\frac{5}{8}$	28	$8\frac{3}{8}$	9	$8\frac{5}{8}$	30	$6\frac{3}{8}$	10	$3\frac{5}{8}$	32	$4\frac{1}{8}$	10	$10\frac{5}{8}$	34	$2\frac{1}{8}$
9	$1\frac{3}{4}$	28	$8\frac{3}{4}$	9	$8\frac{3}{4}$	30	$6\frac{3}{4}$	10	$3\frac{3}{4}$	32	$4\frac{3}{8}$	10	$10\frac{3}{4}$	34	$2\frac{3}{8}$
9	$1\frac{7}{8}$	28	$9\frac{1}{8}$	9	$8\frac{7}{8}$	30	$7\frac{1}{8}$	10	$3\frac{7}{8}$	32	$5\frac{1}{8}$	10	$10\frac{7}{8}$	34	$3\frac{1}{8}$
9	2	28	$9\frac{1}{2}$	9	9	30	$7\frac{1}{2}$	10	4	32	$5\frac{1}{2}$	10	11	34	$3\frac{1}{2}$
9	$2\frac{1}{8}$	28	$9\frac{7}{8}$	9	$9\frac{1}{8}$	30	$7\frac{7}{8}$	10	$4\frac{1}{8}$	32	$5\frac{7}{8}$	10	$11\frac{1}{8}$	34	$3\frac{7}{8}$
9	$2\frac{1}{4}$	28	$10\frac{1}{4}$	9	$9\frac{1}{4}$	30	$8\frac{1}{4}$	10	$4\frac{1}{4}$	32	$6\frac{1}{4}$	10	$11\frac{1}{4}$	34	$4\frac{1}{4}$
9	$2\frac{3}{8}$	28	$10\frac{3}{4}$	9	$9\frac{3}{8}$	30	$8\frac{3}{4}$	10	$4\frac{3}{8}$	32	$6\frac{3}{8}$	10	$11\frac{3}{8}$	34	$4\frac{3}{8}$
9	$2\frac{1}{2}$	28	$11\frac{1}{4}$	9	$9\frac{1}{2}$	30	$9\frac{1}{4}$	10	$4\frac{1}{2}$	32	7	10	$11\frac{1}{2}$	34	5
9	$2\frac{5}{8}$	28	$11\frac{3}{4}$	9	$9\frac{5}{8}$	30	$9\frac{1}{2}$	10	$4\frac{5}{8}$	32	$7\frac{1}{8}$	10	$11\frac{5}{8}$	34	$5\frac{1}{8}$
9	$2\frac{3}{4}$	28	$11\frac{7}{8}$	9	$9\frac{3}{4}$	30	$9\frac{7}{8}$	10	$4\frac{3}{4}$	32	$7\frac{1}{4}$	10	$11\frac{3}{4}$	34	$5\frac{1}{4}$
9	$2\frac{7}{8}$	29	$0\frac{1}{4}$	9	$9\frac{7}{8}$	30	$10\frac{1}{4}$	10	$4\frac{7}{8}$	32	$8\frac{1}{4}$	10	$11\frac{7}{8}$	34	$6\frac{1}{4}$
9	3	29	$0\frac{3}{8}$	9	10	30	$10\frac{3}{8}$	10	5	32	$8\frac{5}{8}$	11		34	$6\frac{5}{8}$
9	$3\frac{1}{8}$	29	1	9	$10\frac{1}{8}$	30	11	10	$5\frac{1}{8}$	32	9	11	$0\frac{1}{8}$	34	7
9	$3\frac{1}{4}$	29	$1\frac{1}{8}$	9	$10\frac{1}{4}$	30	$11\frac{1}{8}$	10	$5\frac{1}{4}$	32	$9\frac{1}{8}$	11	$0\frac{1}{4}$	34	$7\frac{1}{8}$
9	$3\frac{3}{8}$	29	$1\frac{1}{4}$	9	$10\frac{3}{8}$	30	$11\frac{1}{4}$	10	$5\frac{3}{8}$	32	$9\frac{1}{4}$	11	$0\frac{3}{8}$	34	$7\frac{1}{4}$
9	$3\frac{1}{2}$	29	$1\frac{3}{8}$	9	$10\frac{1}{2}$	31	$0\frac{1}{8}$	10	$5\frac{1}{2}$	32	$10\frac{1}{8}$	11	$0\frac{1}{2}$	34	$8\frac{1}{8}$
9	$3\frac{5}{8}$	29	$2\frac{1}{8}$	9	$10\frac{5}{8}$	31	$0\frac{1}{4}$	10	$5\frac{5}{8}$	32	$10\frac{1}{4}$	11	$0\frac{5}{8}$	34	$8\frac{1}{4}$
9	$3\frac{3}{4}$	29	3	9	$10\frac{3}{4}$	31	1	10	$5\frac{3}{4}$	32	11	11	$0\frac{3}{4}$	34	9
9	$3\frac{7}{8}$	29	$3\frac{1}{8}$	9	$10\frac{7}{8}$	31	$1\frac{1}{8}$	10	$5\frac{7}{8}$	32	$11\frac{1}{8}$	11	$0\frac{7}{8}$	34	$9\frac{1}{8}$
9	4	29	$3\frac{1}{4}$	9	11	31	$1\frac{1}{4}$	10	6	32	$11\frac{1}{4}$	11	1	34	$9\frac{1}{4}$
9	$4\frac{1}{8}$	29	$4\frac{1}{8}$	9	$11\frac{1}{8}$	31	$2\frac{1}{8}$	10	$6\frac{1}{8}$	33	$0\frac{1}{8}$	11	$1\frac{1}{8}$	34	$10\frac{1}{8}$
9	$4\frac{1}{4}$	29	$4\frac{3}{8}$	9	$11\frac{1}{4}$	31	$2\frac{3}{8}$	10	$6\frac{1}{4}$	33	$0\frac{3}{8}$	11	$1\frac{1}{4}$	34	$10\frac{1}{2}$
9	$4\frac{3}{8}$	29	5	9	$11\frac{3}{8}$	31	3	10	$6\frac{3}{8}$	33	1	11	$1\frac{3}{8}$	34	11
9	$4\frac{1}{2}$	29	$5\frac{3}{8}$	9	$11\frac{1}{2}$	31	$3\frac{3}{8}$	10	$6\frac{1}{2}$	33	$1\frac{3}{8}$	11	$1\frac{1}{2}$	34	$11\frac{3}{8}$
9	$4\frac{5}{8}$	29	$5\frac{3}{4}$	9	$11\frac{5}{8}$	31	$3\frac{3}{4}$	10	$6\frac{5}{8}$	33	$1\frac{3}{4}$	11	$1\frac{5}{8}$	34	$11\frac{3}{4}$
9	$4\frac{3}{4}$	29	$6\frac{1}{8}$	9	$11\frac{3}{4}$	31	$4\frac{1}{8}$	10	$6\frac{3}{4}$	33	$2\frac{1}{8}$	11	$1\frac{3}{4}$	35	$0\frac{1}{8}$
9	$4\frac{7}{8}$	29	$6\frac{1}{2}$	9	$11\frac{7}{8}$	31	$4\frac{1}{2}$	10	$6\frac{7}{8}$	33	$2\frac{1}{2}$	11	$1\frac{7}{8}$	35	$0\frac{1}{2}$
9	5	29	7	10		31	$4\frac{7}{8}$	10	7	33	$2\frac{7}{8}$	11	2	35	$0\frac{7}{8}$
9	$5\frac{1}{8}$	29	$7\frac{3}{8}$	10	$0\frac{1}{8}$	31	$5\frac{1}{8}$	10	$7\frac{1}{8}$	33	$3\frac{3}{8}$	11	$2\frac{1}{8}$	35	$1\frac{1}{4}$
9	$5\frac{1}{4}$	29	$7\frac{3}{4}$	10	$0\frac{1}{4}$	31	$5\frac{3}{4}$	10	$7\frac{1}{4}$	33	$3\frac{3}{4}$	11	$2\frac{1}{4}$	35	$1\frac{3}{4}$
9	$5\frac{3}{8}$	29	$8\frac{1}{8}$	10	$0\frac{3}{8}$	31	$6\frac{1}{8}$	10	$7\frac{3}{8}$	33	$4\frac{1}{8}$	11	$2\frac{3}{8}$	35	$2\frac{1}{8}$
9	$5\frac{1}{2}$	29	$8\frac{1}{2}$	10	$0\frac{1}{2}$	31	$6\frac{1}{2}$	10	$7\frac{1}{2}$	33	$4\frac{1}{2}$	11	$2\frac{1}{2}$	35	$2\frac{1}{2}$
9	$5\frac{5}{8}$	29	$8\frac{7}{8}$	10	$0\frac{5}{8}$	31	$6\frac{7}{8}$	10	$7\frac{5}{8}$	33	$4\frac{7}{8}$	11	$2\frac{5}{8}$	35	$2\frac{7}{8}$
9	$5\frac{3}{4}$	29	$9\frac{1}{4}$	10	$0\frac{3}{4}$	31	$7\frac{1}{8}$	10	$7\frac{3}{4}$	33	$5\frac{1}{8}$	11	$2\frac{3}{4}$	35	$3\frac{1}{8}$
9	$5\frac{7}{8}$	29	$9\frac{3}{8}$	10	$0\frac{7}{8}$	31	$7\frac{5}{8}$	10	$7\frac{7}{8}$	33	$5\frac{3}{8}$	11	$2\frac{7}{8}$	35	$3\frac{3}{8}$
9	6	29	$10\frac{1}{8}$	10	1	31	$8\frac{1}{8}$	10	8	33	$6\frac{1}{8}$	11	3	35	4
9	$6\frac{1}{8}$	29	$10\frac{3}{8}$	10	$1\frac{1}{8}$	31	$8\frac{3}{8}$	10	$8\frac{1}{8}$	33	$6\frac{1}{4}$	11	$3\frac{1}{8}$	35	$4\frac{1}{8}$
9	$6\frac{1}{4}$	29	$10\frac{7}{8}$	10	$1\frac{1}{4}$	31	$8\frac{7}{8}$	10	$8\frac{1}{4}$	33	$6\frac{7}{8}$	11	$3\frac{1}{4}$	35	$4\frac{1}{4}$
9	$6\frac{3}{8}$	29	$11\frac{1}{8}$	10	$1\frac{3}{8}$	31	$9\frac{1}{8}$	10	$8\frac{3}{8}$	33	$7\frac{1}{8}$	11	$3\frac{3}{8}$	35	$5\frac{1}{8}$
9	$6\frac{1}{2}$	29	$11\frac{3}{8}$	10	$1\frac{1}{2}$	31	$9\frac{3}{8}$	10	$8\frac{1}{2}$	33	$7\frac{3}{8}$	11	$3\frac{1}{2}$	35	$5\frac{3}{8}$
9	$6\frac{5}{8}$	30		10	$1\frac{5}{8}$	31	10	10	$8\frac{5}{8}$	33	8	11	$3\frac{5}{8}$	35	6
9	$6\frac{3}{4}$	30	$0\frac{1}{8}$	10	$1\frac{3}{4}$	31	$10\frac{1}{8}$	10	$8\frac{3}{4}$	33	$8\frac{1}{8}$	11	$3\frac{3}{4}$	35	$6\frac{1}{8}$
9	$6\frac{7}{8}$	30	$0\frac{1}{4}$	10	$1\frac{7}{8}$	31	$10\frac{1}{4}$	10	$8\frac{7}{8}$	33	$8\frac{1}{4}$	11	$3\frac{7}{8}$	35	$6\frac{1}{4}$
9	7	30	$1\frac{1}{8}$	10	2	31	$11\frac{1}{8}$	10	9	33	$9\frac{1}{8}$	11	4	35	$7\frac{1}{8}$
9	$7\frac{1}{8}$	30	$1\frac{1}{4}$	10	$2\frac{1}{8}$	31	$11\frac{1}{4}$	10	$9\frac{1}{8}$	33	$9\frac{1}{4}$	11	$4\frac{1}{8}$	35	$7\frac{1}{4}$
9	$7\frac{1}{4}$	30	2	10	$2\frac{1}{4}$	32		10	$9\frac{1}{4}$	33	10	11	$4\frac{1}{4}$	35	8
9	$7\frac{3}{8}$	30	$2\frac{3}{8}$	10	$2\frac{3}{8}$	32	$0\frac{3}{8}$	10	$9\frac{3}{8}$	33	$10\frac{3}{8}$	11	$4\frac{3}{8}$	35	$8\frac{3}{8}$
9	$7\frac{1}{2}$	30	$2\frac{3}{4}$	10	$2\frac{1}{2}$	32	$0\frac{3}{4}$	10	$9\frac{1}{2}$	33	$10\frac{3}{4}$	11	$4\frac{1}{2}$	35	$8\frac{1}{2}$
9	$7\frac{5}{8}$	30	$3\frac{1}{8}$	10	$2\frac{5}{8}$	32	$1\frac{1}{8}$	10	$9\frac{5}{8}$	33	$11\frac{1}{8}$	11	$4\frac{5}{8}$	35	$9\frac{1}{8}$
9	$7\frac{3}{4}$	30	$3\frac{3}{8}$	10	$2\frac{3}{4}$	32	$1\frac{3}{8}$	10	$9\frac{3}{4}$	33	$11\frac{1}{4}$	11	$4\frac{3}{4}$	35	$9\frac{1}{2}$
9	$7\frac{7}{8}$	30	4	10	$2\frac{7}{8}$	32	2	10	$9\frac{7}{8}$	34		11	$4\frac{7}{8}$	35	10

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
11	5	35	$10\frac{3}{8}$	12		37	$8\frac{3}{8}$	12	7	39	$6\frac{3}{8}$	13	2	41	$4\frac{1}{4}$
11	$5\frac{1}{8}$	35	$10\frac{3}{4}$	12	$0\frac{1}{8}$	37	$8\frac{3}{4}$	12	$7\frac{1}{8}$	39	$6\frac{3}{4}$	13	$2\frac{1}{8}$	41	$4\frac{3}{4}$
11	$5\frac{1}{4}$	35	$11\frac{1}{8}$	12	$0\frac{1}{4}$	37	$9\frac{1}{8}$	12	$7\frac{1}{4}$	39	$7\frac{1}{8}$	13	$2\frac{1}{4}$	41	$5\frac{1}{8}$
11	$5\frac{3}{8}$	35	$11\frac{1}{4}$	12	$0\frac{3}{8}$	37	$9\frac{1}{4}$	12	$7\frac{3}{8}$	39	$7\frac{1}{4}$	13	$2\frac{3}{8}$	41	$5\frac{1}{4}$
11	$5\frac{1}{2}$	35	$11\frac{3}{8}$	12	$0\frac{1}{2}$	37	$9\frac{3}{8}$	12	$7\frac{1}{2}$	39	$7\frac{3}{8}$	13	$2\frac{1}{2}$	41	$5\frac{3}{8}$
11	$5\frac{5}{8}$	36	$0\frac{1}{8}$	12	$0\frac{5}{8}$	37	$10\frac{1}{8}$	12	$7\frac{5}{8}$	39	$8\frac{1}{8}$	13	$2\frac{5}{8}$	41	$6\frac{1}{8}$
11	$5\frac{3}{4}$	36	$0\frac{1}{4}$	12	$0\frac{3}{4}$	37	$10\frac{1}{4}$	12	$7\frac{3}{4}$	39	$8\frac{1}{4}$	13	$2\frac{3}{4}$	41	$6\frac{1}{4}$
11	$5\frac{7}{8}$	36	$1\frac{1}{8}$	12	$0\frac{7}{8}$	37	$11\frac{1}{8}$	12	$7\frac{7}{8}$	39	$9\frac{1}{8}$	13	$2\frac{7}{8}$	41	7
11	6	36	$1\frac{1}{4}$	12	1	37	$11\frac{1}{4}$	12	8	39	$9\frac{1}{4}$	13	3	41	$7\frac{1}{8}$
11	$6\frac{1}{8}$	36	$1\frac{3}{8}$	12	$1\frac{1}{8}$	37	$11\frac{3}{8}$	12	$8\frac{1}{8}$	39	$9\frac{3}{8}$	13	$3\frac{1}{8}$	41	$7\frac{3}{8}$
11	$6\frac{1}{4}$	36	$2\frac{1}{4}$	12	$1\frac{1}{4}$	38	$0\frac{1}{4}$	12	$8\frac{1}{4}$	39	$10\frac{1}{4}$	13	$3\frac{1}{4}$	41	$8\frac{1}{4}$
11	$6\frac{3}{8}$	36	$2\frac{5}{8}$	12	$1\frac{3}{8}$	38	$0\frac{3}{8}$	12	$8\frac{3}{8}$	39	$10\frac{3}{8}$	13	$3\frac{3}{8}$	41	$8\frac{3}{8}$
11	$6\frac{1}{2}$	36	3	12	$1\frac{1}{2}$	38	1	12	$8\frac{1}{2}$	39	11	13	$3\frac{1}{2}$	41	9
11	$6\frac{5}{8}$	36	$3\frac{1}{8}$	12	$1\frac{5}{8}$	38	$1\frac{3}{8}$	12	$8\frac{5}{8}$	39	$11\frac{3}{8}$	13	$3\frac{5}{8}$	41	$9\frac{3}{8}$
11	$6\frac{3}{4}$	36	$3\frac{1}{4}$	12	$1\frac{3}{4}$	38	$1\frac{1}{4}$	12	$8\frac{3}{4}$	39	$11\frac{1}{4}$	13	$3\frac{3}{4}$	41	$9\frac{1}{4}$
11	$6\frac{7}{8}$	36	$4\frac{1}{4}$	12	$1\frac{7}{8}$	38	$2\frac{1}{4}$	12	$8\frac{7}{8}$	40	$0\frac{1}{4}$	13	$3\frac{7}{8}$	41	$10\frac{1}{4}$
11	7	36	$4\frac{5}{8}$	12	2	38	$2\frac{5}{8}$	12	9	40	$0\frac{5}{8}$	13	4	41	$10\frac{5}{8}$
11	$7\frac{1}{8}$	36	5	12	$2\frac{1}{8}$	38	3	12	$9\frac{1}{8}$	40	1	13	$4\frac{1}{8}$	41	11
11	$7\frac{1}{4}$	36	$5\frac{3}{8}$	12	$2\frac{1}{4}$	38	$3\frac{3}{8}$	12	$9\frac{1}{4}$	40	$1\frac{3}{8}$	13	$4\frac{1}{4}$	41	$11\frac{3}{8}$
11	$7\frac{3}{8}$	36	$5\frac{7}{8}$	12	$2\frac{3}{8}$	38	$3\frac{3}{4}$	12	$9\frac{3}{8}$	40	$1\frac{3}{4}$	13	$4\frac{3}{8}$	41	$11\frac{3}{4}$
11	$7\frac{1}{2}$	36	$6\frac{1}{4}$	12	$2\frac{1}{2}$	38	$4\frac{1}{8}$	12	$9\frac{1}{2}$	40	$2\frac{1}{8}$	13	$4\frac{1}{2}$	42	$0\frac{1}{8}$
11	$7\frac{5}{8}$	36	$6\frac{3}{4}$	12	$2\frac{5}{8}$	38	$4\frac{3}{8}$	12	$9\frac{5}{8}$	40	$2\frac{3}{8}$	13	$4\frac{5}{8}$	42	$0\frac{1}{2}$
11	$7\frac{3}{4}$	36	7	12	$2\frac{3}{4}$	38	5	12	$9\frac{3}{4}$	40	3	13	$4\frac{3}{4}$	42	1
11	$7\frac{7}{8}$	36	$7\frac{3}{8}$	12	$2\frac{7}{8}$	38	$5\frac{3}{8}$	12	$9\frac{7}{8}$	40	$3\frac{3}{8}$	13	$4\frac{7}{8}$	42	$1\frac{3}{8}$
11	8	36	$7\frac{3}{4}$	12	3	38	$5\frac{3}{4}$	12	10	40	$3\frac{3}{4}$	13	5	42	$1\frac{3}{4}$
11	$8\frac{1}{8}$	36	$8\frac{1}{4}$	12	$3\frac{1}{8}$	38	$6\frac{1}{8}$	12	$10\frac{1}{8}$	40	$4\frac{1}{8}$	13	$5\frac{1}{8}$	42	$2\frac{1}{8}$
11	$8\frac{1}{4}$	36	$8\frac{1}{2}$	12	$3\frac{1}{4}$	38	$6\frac{1}{2}$	12	$10\frac{1}{4}$	40	$4\frac{1}{2}$	13	$5\frac{1}{4}$	42	$2\frac{1}{2}$
11	$8\frac{3}{8}$	36	9	12	$3\frac{3}{8}$	38	$6\frac{7}{8}$	12	$10\frac{3}{8}$	40	$4\frac{7}{8}$	13	$5\frac{3}{8}$	42	$2\frac{7}{8}$
11	$8\frac{1}{2}$	36	$9\frac{3}{8}$	12	$3\frac{1}{2}$	38	$7\frac{3}{8}$	12	$10\frac{1}{2}$	40	$5\frac{3}{8}$	13	$5\frac{1}{2}$	42	$3\frac{1}{4}$
11	$8\frac{5}{8}$	36	$9\frac{1}{2}$	12	$3\frac{5}{8}$	38	$7\frac{7}{8}$	12	$10\frac{5}{8}$	40	$5\frac{1}{2}$	13	$5\frac{5}{8}$	42	$3\frac{3}{4}$
11	$8\frac{3}{4}$	36	$10\frac{1}{4}$	12	$3\frac{3}{4}$	38	$8\frac{1}{8}$	12	$10\frac{3}{4}$	40	$6\frac{1}{8}$	13	$5\frac{3}{4}$	42	$4\frac{1}{8}$
11	$8\frac{7}{8}$	36	$10\frac{1}{2}$	12	$3\frac{7}{8}$	38	$8\frac{1}{2}$	12	$10\frac{7}{8}$	40	$6\frac{1}{2}$	13	$5\frac{7}{8}$	42	$4\frac{1}{2}$
11	9	36	$10\frac{7}{8}$	12	4	38	$8\frac{7}{8}$	12	11	40	$6\frac{7}{8}$	13	6	42	$4\frac{7}{8}$
11	$9\frac{1}{8}$	36	$11\frac{1}{4}$	12	$4\frac{1}{8}$	38	$9\frac{1}{4}$	12	$11\frac{1}{8}$	40	$7\frac{1}{4}$	13	$6\frac{1}{8}$	42	$5\frac{1}{4}$
11	$9\frac{1}{4}$	36	$11\frac{3}{4}$	12	$4\frac{1}{4}$	38	$9\frac{3}{8}$	12	$11\frac{1}{4}$	40	$7\frac{3}{8}$	13	$6\frac{1}{4}$	42	$5\frac{3}{8}$
11	$9\frac{3}{8}$	37	$0\frac{1}{8}$	12	$4\frac{3}{8}$	38	$10\frac{1}{8}$	12	$11\frac{3}{8}$	40	$8\frac{1}{8}$	13	$6\frac{3}{8}$	42	6
11	$9\frac{1}{2}$	37	$0\frac{1}{4}$	12	$4\frac{1}{2}$	38	$10\frac{1}{4}$	12	$11\frac{1}{2}$	40	$8\frac{1}{4}$	13	$6\frac{1}{2}$	42	$6\frac{1}{4}$
11	$9\frac{5}{8}$	37	$0\frac{3}{8}$	12	$4\frac{5}{8}$	38	$10\frac{3}{8}$	12	$11\frac{5}{8}$	40	$8\frac{3}{8}$	13	$6\frac{5}{8}$	42	$6\frac{3}{8}$
11	$9\frac{3}{4}$	37	$1\frac{1}{4}$	12	$4\frac{3}{4}$	38	$11\frac{1}{4}$	12	$11\frac{3}{4}$	40	$9\frac{1}{4}$	13	$6\frac{3}{4}$	42	$7\frac{1}{4}$
11	$9\frac{7}{8}$	37	$1\frac{3}{8}$	12	$4\frac{7}{8}$	38	$11\frac{3}{8}$	12	$11\frac{7}{8}$	40	$9\frac{3}{8}$	13	$6\frac{7}{8}$	42	$7\frac{3}{8}$
11	10	37	2	12	5	39		13		40	10	13	7	42	8
11	$10\frac{1}{8}$	37	$2\frac{1}{4}$	12	$5\frac{1}{8}$	39	$0\frac{3}{8}$	13	$0\frac{1}{8}$	40	$10\frac{3}{8}$	13	$7\frac{1}{8}$	42	$8\frac{3}{8}$
11	$10\frac{1}{4}$	37	$2\frac{7}{8}$	12	$5\frac{1}{4}$	39	$0\frac{7}{8}$	13	$0\frac{1}{4}$	40	$10\frac{7}{8}$	13	$7\frac{1}{4}$	42	$8\frac{7}{8}$
11	$10\frac{1}{2}$	37	$3\frac{1}{4}$	12	$5\frac{1}{2}$	39	$1\frac{1}{8}$	13	$0\frac{3}{8}$	40	$11\frac{1}{4}$	13	$7\frac{3}{8}$	42	$9\frac{1}{4}$
11	$10\frac{3}{4}$	37	$3\frac{5}{8}$	12	$5\frac{3}{4}$	39	$1\frac{5}{8}$	13	$0\frac{1}{2}$	40	$11\frac{5}{8}$	13	$7\frac{1}{2}$	42	$9\frac{5}{8}$
11	$10\frac{7}{8}$	37	4	12	$5\frac{7}{8}$	39	2	13	$0\frac{5}{8}$	41		13	$7\frac{5}{8}$	42	10
11	$11\frac{1}{8}$	37	$4\frac{3}{8}$	12	$6\frac{1}{4}$	39	$2\frac{3}{8}$	13	$0\frac{3}{4}$	41	$0\frac{3}{8}$	13	$7\frac{3}{4}$	42	$10\frac{3}{8}$
11	$11\frac{3}{8}$	37	$4\frac{7}{8}$	12	$6\frac{3}{8}$	39	$2\frac{7}{8}$	13	$0\frac{7}{8}$	41	$0\frac{3}{4}$	13	$7\frac{7}{8}$	42	$10\frac{3}{4}$
11	11	37	$5\frac{1}{4}$	12	6	39	$3\frac{1}{8}$	13	1	41	$1\frac{1}{8}$	13	8	42	$11\frac{1}{8}$
11	$11\frac{1}{8}$	37	$5\frac{5}{8}$	12	$6\frac{1}{8}$	39	$3\frac{5}{8}$	13	$1\frac{1}{8}$	41	$1\frac{1}{2}$	13	$8\frac{1}{8}$	42	$11\frac{1}{2}$
11	$11\frac{1}{4}$	37	6	12	$6\frac{1}{4}$	39	4	13	$1\frac{1}{4}$	41	2	13	$8\frac{1}{4}$	43	
11	$11\frac{3}{8}$	37	$6\frac{3}{8}$	12	$6\frac{3}{8}$	39	$4\frac{3}{8}$	13	$1\frac{3}{8}$	41	$2\frac{3}{8}$	13	$8\frac{3}{8}$	43	$0\frac{3}{8}$
11	$11\frac{1}{2}$	37	$6\frac{3}{4}$	12	$6\frac{1}{2}$	39	$4\frac{3}{4}$	13	$1\frac{1}{2}$	41	$2\frac{3}{4}$	13	$8\frac{1}{2}$	43	$0\frac{3}{4}$
11	$11\frac{5}{8}$	37	$7\frac{1}{8}$	12	$6\frac{5}{8}$	39	$5\frac{1}{8}$	13	$1\frac{5}{8}$	41	$3\frac{1}{8}$	13	$8\frac{5}{8}$	43	$1\frac{1}{8}$
11	$11\frac{3}{4}$	37	$7\frac{3}{8}$	12	$6\frac{3}{4}$	39	$5\frac{3}{8}$	13	$1\frac{3}{4}$	41	$3\frac{3}{8}$	13	$8\frac{3}{4}$	43	$1\frac{3}{8}$
11	$11\frac{7}{8}$	37	$7\frac{7}{8}$	12	$6\frac{7}{8}$	39	$5\frac{7}{8}$	13	$1\frac{7}{8}$	41	$3\frac{7}{8}$	13	$8\frac{7}{8}$	43	$1\frac{7}{8}$

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
13	9	43	$2\frac{1}{4}$	14	4	45	$0\frac{1}{4}$	14	11	46	$10\frac{1}{4}$	15	6	48	$8\frac{1}{4}$
13	$9\frac{1}{8}$	43	$2\frac{3}{8}$	14	$4\frac{1}{8}$	45	$0\frac{3}{8}$	14	$11\frac{1}{8}$	46	$10\frac{3}{8}$	15	$6\frac{1}{8}$	48	$8\frac{3}{8}$
13	$9\frac{1}{4}$	43	$3\frac{1}{8}$	14	$4\frac{1}{4}$	45	$1\frac{1}{8}$	14	$11\frac{1}{4}$	46	$11\frac{1}{8}$	15	$6\frac{1}{4}$	48	9
13	$9\frac{3}{8}$	43	$3\frac{3}{8}$	14	$4\frac{3}{8}$	45	$1\frac{3}{8}$	14	$11\frac{3}{8}$	46	$11\frac{3}{8}$	15	$6\frac{3}{8}$	48	$9\frac{1}{4}$
13	$9\frac{1}{2}$	43	$3\frac{7}{8}$	14	$4\frac{1}{2}$	45	$1\frac{7}{8}$	14	$11\frac{1}{2}$	46	$11\frac{7}{8}$	15	$6\frac{1}{2}$	48	$9\frac{7}{8}$
13	$9\frac{5}{8}$	43	$4\frac{1}{8}$	14	$4\frac{5}{8}$	45	$2\frac{1}{4}$	14	$11\frac{5}{8}$	47	$0\frac{1}{4}$	15	$6\frac{5}{8}$	48	$10\frac{1}{4}$
13	$9\frac{3}{4}$	43	$4\frac{3}{8}$	14	$4\frac{3}{4}$	45	$2\frac{5}{8}$	14	$11\frac{3}{4}$	47	$0\frac{3}{8}$	15	$6\frac{3}{4}$	48	$10\frac{3}{8}$
13	$9\frac{7}{8}$	43	5	14	$4\frac{7}{8}$	45	3	14	$11\frac{7}{8}$	47	1	15	$6\frac{7}{8}$	48	11
13	10	43	$5\frac{1}{4}$	14	5	45	$3\frac{3}{8}$	15		47	$1\frac{1}{4}$	15	7	48	$11\frac{3}{8}$
13	$10\frac{1}{8}$	43	$5\frac{7}{8}$	14	$5\frac{1}{8}$	45	$3\frac{7}{8}$	15	$0\frac{1}{8}$	47	$1\frac{7}{8}$	15	$7\frac{1}{8}$	48	$11\frac{3}{4}$
13	$10\frac{1}{4}$	43	$6\frac{1}{4}$	14	$5\frac{1}{4}$	45	$4\frac{1}{4}$	15	$0\frac{1}{4}$	47	$2\frac{1}{4}$	15	$7\frac{1}{4}$	49	$0\frac{1}{4}$
13	$10\frac{3}{8}$	43	$6\frac{3}{8}$	14	$5\frac{3}{8}$	45	$4\frac{3}{8}$	15	$0\frac{3}{8}$	47	$2\frac{3}{8}$	15	$7\frac{3}{8}$	49	$0\frac{3}{8}$
13	$10\frac{1}{2}$	43	7	14	$5\frac{1}{2}$	45	$5\frac{1}{4}$	15	$0\frac{1}{2}$	47	3	15	$7\frac{1}{2}$	49	1
13	$10\frac{5}{8}$	43	$7\frac{3}{8}$	14	$5\frac{5}{8}$	45	$5\frac{3}{8}$	15	$0\frac{5}{8}$	47	$3\frac{3}{8}$	15	$7\frac{5}{8}$	49	$1\frac{3}{8}$
13	$10\frac{3}{4}$	43	$7\frac{7}{8}$	14	$5\frac{3}{4}$	45	$5\frac{7}{8}$	15	$0\frac{3}{4}$	47	$3\frac{7}{8}$	15	$7\frac{3}{4}$	49	$1\frac{3}{4}$
13	$10\frac{7}{8}$	43	$8\frac{1}{4}$	14	$5\frac{7}{8}$	45	$6\frac{1}{4}$	15	$0\frac{7}{8}$	47	$4\frac{1}{8}$	15	$7\frac{7}{8}$	49	$2\frac{1}{8}$
13	11	43	$8\frac{5}{8}$	14	6	45	$6\frac{5}{8}$	15	1	47	$4\frac{5}{8}$	15	8	49	$2\frac{1}{2}$
13	$11\frac{1}{8}$	43	9	14	$6\frac{1}{8}$	45	7	15	$1\frac{1}{8}$	47	5	15	$8\frac{1}{8}$	49	3
13	$11\frac{1}{4}$	43	$9\frac{3}{8}$	14	$6\frac{1}{4}$	45	$7\frac{3}{8}$	15	$1\frac{1}{4}$	47	$5\frac{3}{8}$	15	$8\frac{1}{4}$	49	$3\frac{3}{8}$
13	$11\frac{3}{8}$	43	$9\frac{3}{4}$	14	$6\frac{3}{8}$	45	$7\frac{3}{4}$	15	$1\frac{3}{8}$	47	$5\frac{3}{4}$	15	$8\frac{3}{8}$	49	$3\frac{3}{4}$
13	$11\frac{1}{2}$	43	$10\frac{1}{4}$	14	$6\frac{1}{2}$	45	$8\frac{1}{4}$	15	$1\frac{1}{2}$	47	$6\frac{1}{8}$	15	$8\frac{1}{2}$	49	$4\frac{1}{8}$
13	$11\frac{5}{8}$	43	$10\frac{1}{2}$	14	$6\frac{5}{8}$	45	$8\frac{1}{2}$	15	$1\frac{5}{8}$	47	$6\frac{1}{2}$	15	$8\frac{5}{8}$	49	$4\frac{1}{2}$
13	$11\frac{3}{4}$	43	11	14	$6\frac{3}{4}$	45	9	15	$1\frac{3}{4}$	47	$6\frac{7}{8}$	15	$8\frac{3}{4}$	49	$4\frac{7}{8}$
13	$11\frac{7}{8}$	43	$11\frac{3}{8}$	14	$6\frac{7}{8}$	45	$9\frac{3}{8}$	15	$1\frac{7}{8}$	47	$7\frac{7}{8}$	15	$8\frac{7}{8}$	49	$5\frac{1}{4}$
14		43	$11\frac{3}{4}$	14	7	45	$9\frac{3}{4}$	15	2	47	$7\frac{3}{4}$	15	9	49	$5\frac{3}{4}$
14	$0\frac{1}{8}$	44	$0\frac{1}{8}$	14	$7\frac{1}{8}$	45	$10\frac{1}{4}$	15	$2\frac{1}{8}$	47	$8\frac{1}{8}$	15	$9\frac{1}{8}$	49	$6\frac{1}{4}$
14	$0\frac{1}{4}$	44	$0\frac{1}{4}$	14	$7\frac{1}{4}$	45	$10\frac{1}{4}$	15	$2\frac{1}{4}$	47	$8\frac{1}{4}$	15	$9\frac{1}{4}$	49	$6\frac{1}{4}$
14	$0\frac{3}{8}$	44	$0\frac{7}{8}$	14	$7\frac{3}{8}$	45	$10\frac{7}{8}$	15	$2\frac{3}{8}$	47	$8\frac{7}{8}$	15	$9\frac{3}{8}$	49	$6\frac{7}{8}$
14	$0\frac{1}{2}$	44	$1\frac{1}{4}$	14	$7\frac{1}{2}$	45	$11\frac{1}{4}$	15	$2\frac{1}{2}$	47	$9\frac{1}{4}$	15	$9\frac{1}{2}$	49	$7\frac{1}{4}$
14	$0\frac{5}{8}$	44	$1\frac{7}{8}$	14	$7\frac{5}{8}$	45	$11\frac{5}{8}$	15	$2\frac{5}{8}$	47	$9\frac{5}{8}$	15	$9\frac{5}{8}$	49	$7\frac{5}{8}$
14	$0\frac{3}{4}$	44	$2\frac{1}{4}$	14	$7\frac{3}{4}$	46	$0\frac{1}{4}$	15	$2\frac{3}{4}$	47	$10\frac{1}{4}$	15	$9\frac{3}{4}$	49	8
14	$0\frac{7}{8}$	44	$2\frac{7}{8}$	14	$7\frac{7}{8}$	46	$0\frac{1}{2}$	15	$2\frac{7}{8}$	47	$10\frac{1}{2}$	15	$9\frac{7}{8}$	49	$8\frac{1}{2}$
14	1	44	$2\frac{7}{4}$	14	8	46	$0\frac{7}{8}$	15	3	47	$10\frac{7}{8}$	15	10	49	$8\frac{7}{8}$
14	$1\frac{1}{8}$	44	$3\frac{1}{8}$	14	$8\frac{1}{8}$	46	$1\frac{1}{4}$	15	$3\frac{1}{8}$	47	$11\frac{1}{4}$	15	$10\frac{1}{8}$	49	$9\frac{1}{4}$
14	$1\frac{1}{4}$	44	$3\frac{3}{8}$	14	$8\frac{1}{4}$	46	$1\frac{3}{8}$	15	$3\frac{1}{4}$	47	$11\frac{3}{8}$	15	$10\frac{1}{4}$	49	$9\frac{3}{4}$
14	$1\frac{3}{8}$	44	4	14	$8\frac{3}{8}$	46	2	15	$3\frac{3}{8}$	48		15	$10\frac{3}{8}$	49	$10\frac{1}{4}$
14	$1\frac{1}{2}$	44	$4\frac{1}{8}$	14	$8\frac{1}{2}$	46	$2\frac{3}{8}$	15	$3\frac{1}{2}$	48	$0\frac{3}{8}$	15	$10\frac{1}{2}$	49	$10\frac{1}{2}$
14	$1\frac{5}{8}$	44	$4\frac{7}{8}$	14	$8\frac{5}{8}$	46	$2\frac{7}{8}$	15	$3\frac{5}{8}$	48	$0\frac{7}{8}$	15	$10\frac{5}{8}$	49	$10\frac{7}{8}$
14	$1\frac{3}{4}$	44	$5\frac{1}{4}$	14	$8\frac{3}{4}$	46	$3\frac{1}{4}$	15	$3\frac{3}{4}$	48	$1\frac{1}{4}$	15	$10\frac{3}{4}$	49	$11\frac{1}{4}$
14	$1\frac{7}{8}$	44	$5\frac{5}{8}$	14	$8\frac{7}{8}$	46	$3\frac{5}{8}$	15	$3\frac{7}{8}$	48	$1\frac{5}{8}$	15	$10\frac{7}{8}$	49	$11\frac{5}{8}$
14	2	44	6	14	9	46	4	15	4	48	2	15	11	50	
14	$2\frac{1}{8}$	44	$6\frac{3}{4}$	14	$9\frac{1}{8}$	46	$4\frac{3}{8}$	15	$4\frac{1}{8}$	48	$2\frac{3}{8}$	15	$11\frac{1}{8}$	50	$0\frac{1}{4}$
14	$2\frac{1}{4}$	44	$6\frac{7}{8}$	14	$9\frac{1}{4}$	46	$4\frac{5}{8}$	15	$4\frac{1}{4}$	48	$2\frac{7}{8}$	15	$11\frac{1}{4}$	50	$0\frac{1}{2}$
14	$2\frac{3}{8}$	44	$7\frac{1}{8}$	14	$9\frac{3}{8}$	46	$5\frac{1}{4}$	15	$4\frac{3}{8}$	48	$3\frac{1}{4}$	15	$11\frac{3}{8}$	50	$1\frac{1}{8}$
14	$2\frac{1}{2}$	44	$7\frac{5}{8}$	14	$9\frac{1}{2}$	46	$5\frac{5}{8}$	15	$4\frac{1}{2}$	48	$3\frac{1}{2}$	15	$11\frac{1}{2}$	50	$1\frac{5}{8}$
14	$2\frac{5}{8}$	44	8	14	$9\frac{5}{8}$	46	6	15	$4\frac{5}{8}$	48	4	15	$11\frac{5}{8}$	50	2
14	$2\frac{3}{4}$	44	$8\frac{3}{8}$	14	$9\frac{3}{4}$	46	$6\frac{3}{8}$	15	$4\frac{3}{4}$	48	$4\frac{3}{8}$	15	$11\frac{3}{4}$	50	$2\frac{3}{8}$
14	$2\frac{7}{8}$	44	$8\frac{3}{4}$	14	$9\frac{7}{8}$	46	$6\frac{3}{4}$	15	$4\frac{7}{8}$	48	$4\frac{3}{4}$	15	$11\frac{7}{8}$	50	$2\frac{3}{4}$
14	3	44	$9\frac{1}{4}$	14	10	46	$7\frac{1}{8}$	15	5	48	$5\frac{1}{8}$	16		50	$3\frac{1}{8}$
14	$3\frac{1}{8}$	44	$9\frac{7}{8}$	14	$10\frac{1}{8}$	46	$7\frac{1}{4}$	15	$5\frac{1}{8}$	48	$5\frac{1}{4}$	16	$0\frac{1}{8}$	50	$3\frac{1}{2}$
14	$3\frac{1}{4}$	44	$9\frac{7}{8}$	14	$10\frac{1}{4}$	46	$7\frac{3}{8}$	15	$5\frac{1}{4}$	48	$5\frac{3}{8}$	16	$0\frac{1}{4}$	50	$3\frac{7}{8}$
14	$3\frac{3}{8}$	44	$10\frac{3}{8}$	14	$10\frac{3}{8}$	46	$7\frac{5}{8}$	15	$5\frac{3}{8}$	48	$5\frac{7}{8}$	16	$0\frac{3}{8}$	50	$4\frac{1}{4}$
14	$3\frac{1}{2}$	44	$10\frac{3}{4}$	14	$10\frac{1}{2}$	46	$8\frac{1}{4}$	15	$5\frac{1}{2}$	48	$6\frac{1}{4}$	16	$0\frac{1}{2}$	50	$4\frac{3}{4}$
14	$3\frac{5}{8}$	44	$11\frac{1}{8}$	14	$10\frac{5}{8}$	46	$9\frac{1}{4}$	15	$5\frac{5}{8}$	48	$7\frac{1}{4}$	16	$0\frac{5}{8}$	50	$5\frac{1}{8}$
14	$3\frac{3}{4}$	44	$11\frac{1}{2}$	14	$10\frac{3}{4}$	46	$9\frac{1}{2}$	15	$5\frac{3}{4}$	48	$7\frac{3}{4}$	16	$0\frac{3}{4}$	50	$5\frac{3}{8}$
14	$3\frac{7}{8}$	44	$11\frac{7}{8}$	14	$10\frac{7}{8}$	46	$9\frac{3}{4}$	15	$5\frac{7}{8}$	48	$7\frac{7}{8}$	16	$0\frac{7}{8}$	50	$5\frac{7}{8}$

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
16	1	50	6¼	16	8	52	4¼	17	3	54	2¼	17	10	56	0¼
16	1⅛	50	6⅜	16	8⅛	52	4⅜	17	3⅛	54	2⅜	17	10⅛	56	0⅜
16	1¼	50	7	16	8¼	52	5	17	3¼	54	3	17	10¼	56	1
16	1⅜	50	7⅛	16	8⅜	52	5⅛	17	3⅜	54	3⅛	17	10⅜	56	1⅛
16	1½	50	7⅜	16	8½	52	5⅜	17	3½	54	3⅜	17	10½	56	1⅜
16	1⅝	50	8¼	16	8⅝	52	6¼	17	3⅝	54	4¼	17	10⅝	56	2¼
16	1¾	50	8⅜	16	8¾	52	6⅜	17	3¾	54	4⅜	17	10¾	56	2⅜
16	1⅞	50	9	16	8⅞	52	7	17	3⅞	54	5	17	10⅞	56	3
16	2	50	9⅜	16	9	52	7⅜	17	4	54	5⅜	17	11	56	3⅜
16	2⅛	50	9¼	16	9⅛	52	7¼	17	4⅛	54	5¼	17	11⅛	56	3¼
16	2¼	50	10⅛	16	9¼	52	8⅛	17	4¼	54	6⅛	17	11¼	56	4⅛
16	2⅜	50	10⅜	16	9⅜	52	8⅜	17	4⅜	54	6⅜	17	11⅜	56	4½
16	2½	50	11	16	9½	52	9	17	4½	54	7	17	11½	56	5
16	2⅝	50	11⅛	16	9⅝	52	9⅜	17	4⅝	54	7⅛	17	11⅝	56	5⅛
16	2¾	50	11¼	16	9¾	52	9¾	17	4¾	54	7¼	17	11¾	56	5¼
16	2⅞	51	0⅛	16	9⅞	52	10⅛	17	4⅞	54	8⅛	17	11⅞	56	6⅛
16	3	51	0½	16	10	52	10½	17	5	54	8½	18		56	6½
16	3⅛	51	1	16	10⅛	52	11	17	5⅛	54	8⅞	18	0⅛	56	6⅞
16	3¼	51	1⅜	16	10¼	52	11⅜	17	5¼	54	9⅜	18	0¼	56	7¼
16	3⅜	51	1¾	16	10⅜	52	11¾	17	5⅜	54	9¾	18	0⅜	56	7⅝
16	3½	51	2⅛	16	10½	53	0⅛	17	5½	54	10⅛	18	0½	56	8⅛
16	3⅝	51	2½	16	10⅝	53	0½	17	5⅝	54	10½	18	0⅝	56	8½
16	3¾	51	2⅞	16	10¾	53	0⅞	17	5¾	54	10⅞	18	0¾	56	8⅞
16	3⅞	51	3¼	16	10⅞	53	1¼	17	5⅞	54	11¼	18	0⅞	56	9¼
16	4	51	3⅝	16	11	53	1⅝	17	6	54	11⅝	18	1	56	9⅝
16	4⅛	51	4⅛	16	11⅛	53	2	17	6⅛	55	0⅛	18	1⅛	56	10
16	4¼	51	4½	16	11¼	53	2½	17	6¼	55	0½	18	1¼	56	10⅜
16	4⅜	51	4⅞	16	11⅜	53	2⅞	17	6⅜	55	0⅞	18	1⅜	56	10⅞
16	4½	51	5¼	16	11½	53	3¼	17	6½	55	1¼	18	1½	56	11¼
16	4⅝	51	5⅝	16	11⅝	53	3⅝	17	6⅝	55	1⅝	18	1⅝	56	11⅝
16	4¾	51	6	16	11¾	53	4	17	6¾	55	2	18	1¾	57	
16	4⅞	51	6½	16	11⅞	53	4½	17	6⅞	55	2⅜	18	1⅞	57	0⅜
16	5	51	6⅞	17		53	4⅞	17	7	55	2⅞	18	2	57	0¾
16	5⅛	51	7⅛	17	0⅛	53	5¼	17	7⅛	55	3¼	18	2⅛	57	1¼
16	5¼	51	7⅜	17	0¼	53	5⅝	17	7¼	55	3⅜	18	2¼	57	1⅝
16	5⅜	51	8	17	0⅜	53	6	17	7⅜	55	4	18	2⅜	57	2
16	5½	51	8⅜	17	0½	53	6⅜	17	7½	55	4⅜	18	2½	57	2⅜
16	5⅝	51	8¾	17	0⅝	53	6¾	17	7⅝	55	4¾	18	2⅝	57	2¾
16	5¾	51	9¼	17	0¾	53	7¼	17	7¾	55	5¼	18	2¾	57	3⅛
16	5⅞	51	9½	17	0⅞	53	7⅝	17	7⅞	55	5½	18	2⅞	57	3½
16	6	51	10	17	1	53	8	17	8	55	6	18	3	57	4
16	6⅛	51	10⅜	17	1⅛	53	8⅜	17	8⅛	55	6⅜	18	3⅛	57	4⅜
16	6¼	51	10¾	17	1¼	53	8¾	17	8¼	55	6¾	18	3¼	57	4¾
16	6⅜	51	11¼	17	1⅜	53	9¼	17	8⅜	55	7⅛	18	3⅜	57	5⅛
16	6½	51	11½	17	1½	53	9½	17	8½	55	7½	18	3½	57	5½
16	6⅝	52		17	1⅝	53	10	17	8⅝	55	7⅞	18	3⅝	57	5⅞
16	6¾	52	0⅜	17	1¾	53	10⅜	17	8¾	55	8⅜	18	3¾	57	6⅜
16	6⅞	52	0¾	17	1⅞	53	10¾	17	8⅞	55	8¾	18	3⅞	57	6¾
16	7	52	1⅛	17	2	53	11⅛	17	9	55	9⅛	18	4	57	7⅛
16	7⅛	52	1¼	17	2⅛	53	11½	17	9⅛	55	9½	18	4⅛	57	7½
16	7¼	52	1⅞	17	2¼	53	11⅞	17	9¼	55	9⅞	18	4¼	57	7⅞
16	7⅜	52	2¼	17	2⅜	54	0¼	17	9⅜	55	10⅛	18	4⅜	57	8¼
16	7½	52	2⅝	17	2½	54	0⅝	17	9½	55	10½	18	4½	57	8⅝
16	7⅝	52	3⅛	17	2⅝	54	1⅛	17	9⅝	55	11⅛	18	4⅝	57	9
16	7¾	52	3¼	17	2¾	54	1½	17	9¾	55	11½	18	4¾	57	9⅜
16	7⅞	52	3⅝	17	2⅞	54	1⅞	17	9⅞	55	11⅞	18	4⅞	57	9⅞

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
18	5	57	$10\frac{1}{4}$	18	10	59	2	19	3	60	$5\frac{5}{8}$	19	8	61	$9\frac{3}{8}$
18	$5\frac{1}{8}$	57	$10\frac{3}{8}$	18	$10\frac{1}{8}$	59	$2\frac{3}{8}$	19	$3\frac{1}{8}$	60	6	19	$8\frac{1}{8}$	61	$9\frac{3}{4}$
18	$5\frac{1}{4}$	57	11	18	$10\frac{1}{4}$	59	$2\frac{1}{2}$	19	$3\frac{1}{4}$	60	$6\frac{1}{8}$	19	$8\frac{1}{4}$	61	$10\frac{1}{8}$
18	$5\frac{3}{8}$	57	$11\frac{3}{8}$	18	$10\frac{3}{8}$	59	$3\frac{1}{8}$	19	$3\frac{3}{8}$	60	$6\frac{7}{8}$	19	$8\frac{3}{8}$	61	$10\frac{1}{2}$
18	$5\frac{1}{2}$	57	$11\frac{3}{4}$	18	$10\frac{1}{2}$	59	$3\frac{1}{2}$	19	$3\frac{1}{2}$	60	$7\frac{1}{4}$	19	$8\frac{1}{2}$	61	11
18	$5\frac{5}{8}$	58	$0\frac{1}{4}$	18	$10\frac{5}{8}$	59	$3\frac{7}{8}$	19	$3\frac{5}{8}$	60	$7\frac{5}{8}$	19	$8\frac{5}{8}$	61	$11\frac{3}{8}$
18	$5\frac{3}{4}$	58	$0\frac{3}{8}$	18	$10\frac{3}{4}$	59	$4\frac{1}{4}$	19	$3\frac{3}{4}$	60	8	19	$8\frac{3}{4}$	61	$11\frac{3}{4}$
18	$5\frac{7}{8}$	58	1	18	$10\frac{7}{8}$	59	$4\frac{1}{4}$	19	$3\frac{7}{8}$	60	$8\frac{3}{8}$	19	$8\frac{7}{8}$	62	$0\frac{1}{8}$
18	6	58	$1\frac{3}{8}$	18	11	59	$5\frac{1}{8}$	19	4	60	$8\frac{3}{4}$	19	9	62	$0\frac{1}{2}$
18	$6\frac{1}{8}$	58	$1\frac{3}{4}$	18	$11\frac{1}{8}$	59	$5\frac{1}{2}$	19	$4\frac{1}{8}$	60	$9\frac{1}{8}$	19	$9\frac{1}{8}$	62	$0\frac{7}{8}$
18	$6\frac{1}{4}$	58	$2\frac{1}{8}$	18	$11\frac{1}{4}$	59	$5\frac{7}{8}$	19	$4\frac{1}{4}$	60	$9\frac{5}{8}$	19	$9\frac{1}{4}$	62	$1\frac{1}{4}$
18	$6\frac{3}{8}$	58	$2\frac{1}{2}$	18	$11\frac{3}{8}$	59	$6\frac{1}{4}$	19	$4\frac{3}{8}$	60	10	19	$9\frac{3}{8}$	62	$1\frac{5}{8}$
18	$6\frac{1}{2}$	58	3	18	$11\frac{1}{2}$	59	$6\frac{5}{8}$	19	$4\frac{1}{2}$	60	$10\frac{3}{8}$	19	$9\frac{1}{2}$	62	$2\frac{1}{8}$
18	$6\frac{5}{8}$	58	$3\frac{3}{8}$	18	$11\frac{5}{8}$	59	7	19	$4\frac{5}{8}$	60	$10\frac{3}{4}$	19	$9\frac{5}{8}$	62	$2\frac{1}{2}$
18	$6\frac{3}{4}$	58	$3\frac{3}{4}$	18	$11\frac{3}{4}$	59	$7\frac{1}{4}$	19	$4\frac{3}{4}$	60	$11\frac{1}{8}$	19	$9\frac{3}{4}$	62	$2\frac{7}{8}$
18	$6\frac{7}{8}$	58	$4\frac{1}{8}$	18	$11\frac{7}{8}$	59	$7\frac{7}{8}$	19	$4\frac{7}{8}$	60	$11\frac{1}{2}$	19	$9\frac{7}{8}$	62	$3\frac{1}{4}$
18	7	58	$4\frac{1}{2}$	19		59	$8\frac{1}{8}$	19	5	60	$11\frac{7}{8}$	19	10	62	$3\frac{5}{8}$
18	$7\frac{1}{8}$	58	$4\frac{7}{8}$	19	$0\frac{1}{8}$	59	$8\frac{1}{8}$	19	$5\frac{1}{8}$	61	$0\frac{3}{8}$	19	$10\frac{1}{8}$	62	4
18	$7\frac{1}{4}$	58	$5\frac{1}{4}$	19	$0\frac{1}{4}$	59	9	19	$5\frac{1}{4}$	61	$0\frac{3}{4}$	19	$10\frac{1}{4}$	62	$4\frac{3}{8}$
18	$7\frac{3}{8}$	58	$5\frac{3}{4}$	19	$0\frac{3}{8}$	59	$9\frac{3}{8}$	19	$5\frac{3}{8}$	61	$1\frac{1}{8}$	19	$10\frac{3}{8}$	62	$4\frac{7}{8}$
18	$7\frac{1}{2}$	58	$6\frac{1}{8}$	19	$0\frac{1}{2}$	59	$9\frac{3}{4}$	19	$5\frac{1}{2}$	61	$1\frac{1}{2}$	19	$10\frac{1}{2}$	62	$5\frac{1}{4}$
18	$7\frac{5}{8}$	58	$6\frac{1}{2}$	19	$0\frac{5}{8}$	59	$10\frac{1}{8}$	19	$5\frac{5}{8}$	61	$1\frac{7}{8}$	19	$10\frac{5}{8}$	62	$5\frac{5}{8}$
18	$7\frac{3}{4}$	58	$6\frac{7}{8}$	19	$0\frac{3}{4}$	59	$10\frac{3}{8}$	19	$5\frac{3}{4}$	61	$2\frac{1}{8}$	19	$10\frac{3}{4}$	62	6
18	$7\frac{7}{8}$	58	$7\frac{1}{4}$	19	$0\frac{7}{8}$	59	11	19	$5\frac{7}{8}$	61	$2\frac{3}{4}$	19	$10\frac{7}{8}$	62	$6\frac{3}{8}$
18	8	58	$7\frac{5}{8}$	19	1	59	$11\frac{3}{8}$	19	6	61	$3\frac{1}{8}$	19	11	62	$6\frac{3}{4}$
18	$8\frac{1}{8}$	58	8	19	$1\frac{1}{8}$	59	$11\frac{3}{4}$	19	$6\frac{1}{8}$	61	$3\frac{1}{2}$	19	$11\frac{1}{4}$	62	$7\frac{1}{8}$
18	$8\frac{1}{4}$	58	$8\frac{1}{4}$	19	$1\frac{1}{4}$	60	$0\frac{1}{4}$	19	$6\frac{1}{4}$	61	$3\frac{7}{8}$	19	$11\frac{1}{4}$	62	$7\frac{1}{2}$
18	$8\frac{3}{8}$	58	$8\frac{7}{8}$	19	$1\frac{3}{8}$	60	$0\frac{1}{2}$	19	$6\frac{3}{8}$	61	$4\frac{1}{8}$	19	$11\frac{3}{8}$	62	8
18	$8\frac{1}{2}$	58	$9\frac{1}{4}$	19	$1\frac{1}{2}$	60	1	19	$6\frac{1}{2}$	61	$4\frac{3}{8}$	19	$11\frac{1}{2}$	62	$8\frac{3}{8}$
18	$8\frac{5}{8}$	58	$9\frac{5}{8}$	19	$1\frac{5}{8}$	60	$1\frac{3}{8}$	19	$6\frac{5}{8}$	61	5	19	$11\frac{5}{8}$	62	$8\frac{3}{4}$
18	$8\frac{3}{4}$	58	10	19	$1\frac{3}{4}$	60	$1\frac{3}{4}$	19	$6\frac{3}{4}$	61	$5\frac{1}{8}$	19	$11\frac{3}{4}$	62	$9\frac{1}{8}$
18	$8\frac{7}{8}$	58	$10\frac{3}{8}$	19	$1\frac{7}{8}$	60	$2\frac{1}{8}$	19	$6\frac{7}{8}$	61	$5\frac{7}{8}$	19	$11\frac{7}{8}$	62	$9\frac{1}{2}$
18	9	58	$10\frac{3}{4}$	19	2	60	$2\frac{1}{4}$	19	7	61	$6\frac{1}{8}$	20	0	62	$9\frac{7}{8}$
18	$9\frac{1}{8}$	58	$11\frac{1}{4}$	19	$2\frac{1}{8}$	60	$2\frac{3}{8}$	19	$7\frac{1}{8}$	61	$6\frac{5}{8}$	20	$0\frac{1}{4}$	62	$10\frac{3}{8}$
18	$9\frac{1}{4}$	58	$11\frac{7}{8}$	19	$2\frac{1}{4}$	60	$3\frac{1}{4}$	19	$7\frac{1}{4}$	61	7	20	$0\frac{1}{2}$	62	$10\frac{3}{4}$
18	$9\frac{3}{8}$	59		19	$2\frac{3}{8}$	60	$3\frac{3}{8}$	19	$7\frac{3}{8}$	61	$7\frac{3}{8}$	20	$0\frac{3}{4}$	62	$11\frac{1}{8}$
18	$9\frac{1}{2}$	59	$0\frac{3}{8}$	19	$2\frac{1}{2}$	60	$4\frac{1}{8}$	19	$7\frac{1}{2}$	61	$7\frac{3}{4}$	20	$0\frac{1}{8}$	62	$11\frac{1}{2}$
18	$9\frac{5}{8}$	59	$0\frac{7}{8}$	19	$2\frac{5}{8}$	60	$4\frac{1}{2}$	19	$7\frac{5}{8}$	61	$8\frac{1}{8}$	20	$0\frac{5}{8}$	62	$11\frac{7}{8}$
18	$9\frac{3}{4}$	59	$1\frac{1}{8}$	19	$2\frac{3}{4}$	60	$4\frac{7}{8}$	19	$7\frac{3}{4}$	61	$8\frac{3}{8}$	20	$0\frac{3}{4}$	63	$0\frac{1}{4}$
18	$9\frac{7}{8}$	59	$1\frac{1}{2}$	19	$2\frac{7}{8}$	60	$5\frac{1}{4}$	19	$7\frac{7}{8}$	61	9	20	$0\frac{7}{8}$	63	$0\frac{5}{8}$

APPLICATION OF THE PRECEDING TABLE (P. 5–9).

EXAMPLE 1.—What is the area of a circle 10 feet 6 inches in diameter?

At page 5, in column 8, and opposite to $10\frac{1}{2}$, is 86.590, which is the result required.

EXAMPLE 2.—What is the circumference of a circle $10\frac{1}{2}$ inches in diameter?

At page 5, in column 9, and opposite to $10\frac{1}{2}$, is 32.99, which is the result required.

When it is required to reduce the decimal remainders in this table to denominations of yards, feet, inches, etc,

Multiply the decimal by the number of parts in the denomination required, and cut off as many places for a remainder, to the right hand, as there are places in the given decimal.

EXAMPLE.—What is the value of .590 foot?

.590
12 inches in a foot.
7.080

7 inches and .080 of an inch.

APPLICATION OF THE PRECEDING TABLE (P. 16–24).

In addition to the general use of this table in giving the circumferences of circles from one inch to twenty feet in diameter, in the ordinary designations of feet, inches, and eighths, it is of especial utility in its adaptation to the requirements of boiler-makers and blacksmiths in the determination of the length of materials required for hoops, tyers, etc., etc.

Note.—In the formation of metallic hoops, tyers, etc., a contraction of their inner surface takes place, the exact allowance for which is the thickness of the metal, which, therefore, must be added to the diameter for which the circumference is required.

EXAMPLE.—What is the length of a bar required to form a hoop of 6 feet $9\frac{1}{8}$ inches in diameter, the thickness of the metal being $\frac{1}{2}$ an inch?

6 feet $9\frac{1}{8}$ inches, added to $\frac{1}{2}$ an inch, gives 6 feet $9\frac{5}{8}$ inches for the diameter, the circumference for which (page 19) is 21 feet $4\frac{3}{8}$ inches, which is the result required.

Note.—When, in the formation of bands, etc., the bar of metal is to be bent upon its edge, the *breadth* of the bar must be added to the diameter, instead of the thickness of it.

When a flanged or ribbed bar is used, as with rail-car tyers, tanks, etc.

The contraction of the inner surface of the metal and the necessary addition to the diameter of the wheel or hoop will depend upon the conformation of the bar, inasmuch as the weakest edges will both contract or attenuate the most, according as they are upon the inner or outer surface.

When the tyer or bar has its flange on the outside.

To the inner diameter add the thickness of the metal and two thirds of the breadth of the flange.

Application of the preceding table to an elliptic hoop.

To half the sum of the diameters add the thickness of the metal, and proceed as directed for plain bars.

In the construction of elliptic hoops of angled iron, reference must be had to the tables for angled iron: thus, when the angle is outside, it must be added to the diameter, and when it is on the inside, it must be subtracted therefrom.

NOTE.—*In determining the length of a bar*, an allowance for the thickening of the ends must be made where welding is necessary.

Mr. James Foden, of Liverpool, has found that, in an angled bar of uniform thickness, the curve that will exactly compensate for the greater contraction of its inner surface, when it is bent in a ring, is one of which four times the circumference of the ring is its radius.

Application of the table to the construction of teethed wheels.

To ascertain the circumference and diameter of a wheel, for a given number of teeth and pitch.

RULE.—Multiply the pitch of the teeth by the number of teeth the wheel is to contain, and the product will be the circumference.

EXAMPLE.—The pitch of a tooth is to be $2\frac{5}{8}$ inches, and the number of teeth 60; what will be the circumference and diameter of the wheel?

60 number of teeth.
$2\frac{5}{8}$ pitch.

120
30
$7\frac{1}{2}$

12)$157\frac{1}{2}$

13 $1\frac{1}{2}$ circumference of wheel.

In column 8, page 17, opposite to this, is 4 feet $2\frac{1}{8}$ inches, which is the diameter required.

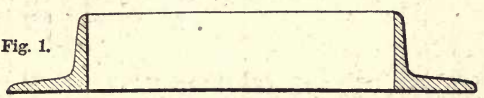
NOTE.—In the construction of these tables, where the last fraction has been equal to or exceeded .5, 1 has been added. Thus, 3.14159, if set down to four places of decimals, would be 3.1416.

CIRCUMFERENCES OF ANGLED HOOPS,

From 6 *inches to* 10 *feet.*

ANGLED OUTSIDE.

Fig. 1.



NOTE.—The breadth of the edge flange (2¼) must be added to the inner diameter (10) of the hoop or ring required.

Diam.	Circum.	Diam.	Circum.	Diam.	Circum.	Diam.	Circum.
INCH.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.
6.	1 5⅝	0 11	2 8½	1 4	3 10⅞	1 9	5 1½
·⅛	1 6	0 11⅛	2 8⅝	1 4⅛	3 11¼	1 9⅛	5 1⅝
·¼	1 6⅜	0 11¼	2 9	1 4¼	3 11⅝	1 9¼	5 2¼
·⅜	1 6⅝	0 11⅜	2 9⅜	1 4⅜	4	1 9⅜	5 2⅝
·½	1 7	0 11½	2 9½	1 4½	4 0⅜	1 9½	5 3
·⅝	1 7⅜	0 11⅝	2 10⅛	1 4⅝	4 0¼	1 9⅝	5 3⅜
·¾	1 7¼	0 11¾	2 10⅜	1 4¾	4 1⅛	1 9¾	5 3¾
·⅞	1 8⅛	0 11⅞	2 10¾	1 4⅞	4 1½	1 9⅞	5 4⅛
7.	1 8½	1	2 11⅛	1 5	4 1⅞	1 10	5 4½
·⅛	1 8⅞	1 0⅛	2 11⅜	1 5⅛	4 2¼	1 10⅛	5 4⅞
·¼	1 9¼	1 0¼	2 11⅞	1 5¼	4 2⅝	1 10¼	5 5¼
·⅜	1 9⅝	1 0⅜	3 0⅛	1 5⅜	4 2⅞	1 10⅜	5 5⅝
·½	1 10	1 0½	3 0⅝	1 5½	4 3¼	1 10½	5 6
·⅝	1 10⅜	1 0⅝	3 1	1 5⅝	4 3⅝	1 10⅝	5 6⅜
·¾	1 10¾	1 0¾	3 1⅜	1 5¾	4 4	1 10¾	5 6⅝
·⅞	1 11⅛	1 0⅞	3 1¾	1 5⅞	4 4⅜	1 10⅞	5 7
8.	1 11½	1 1	3 2⅛	1 6	4 4⅞	1 11	5 7⅜
·⅛	1 11⅞	1 1⅛	3 2⅜	1 6⅛	4 5¼	1 11⅛	5 7¾
·¼	2 0⅜	1 1¼	3 2⅞	1 6¼	4 5⅝	1 11¼	5 8⅛
·⅜	2 0¾	1 1⅜	3 3¼	1 6⅜	4 5⅞	1 11⅜	5 8½
·½	2 1¼	1 1½	3 3⅝	1 6½	4 6¼	1 11½	5 8⅞
·⅝	2 1⅝	1 1⅝	3 4	1 6⅝	4 6⅝	1 11⅝	5 9¼
·¾	2 2	1 1¾	3 4⅜	1 6¾	4 7	1 11¾	5 9⅝
·⅞	2 2⅜	1 1⅞	3 4⅝	1 6⅞	4 7⅜	1 11⅞	5 10
9.	2 2¾	1 2	3 5	1 7	4 7¾	2	5 10⅜
·⅛	2 3⅛	1 2⅛	3 5⅜	1 7⅛	4 8	2 0⅛	5 10¾
·¼	2 3½	1 2¼	3 5¾	1 7¼	4 8⅜	2 0¼	5 11⅛
·⅜	2 3⅞	1 2⅜	3 6⅛	1 7⅜	4 8¾	2 0⅜	5 11½
·½	2 4¼	1 2½	3 6⅝	1 7½	4 9¼	2 0½	5 11⅞
·⅝	2 4⅝	1 2⅝	3 7¼	1 7⅝	4 9⅝	2 0⅝	6 0⅜
·¾	2 5	1 2¾	3 7⅝	1 7¾	4 10⅛	2 0¾	6 0¾
·⅞	2 5⅜	1 2⅞	3 8	1 7⅞	4 10⅝	2 1	6 1⅛
10.	2 5¾	1 3	3 8⅜	1 8	4 11	2 1⅛	6 1½
·⅛	2 6⅛	1 3⅛	3 8¾	1 8⅛	4 11⅜	2 1¼	6 1⅞
·¼	2 6½	1 3¼	3 9¼	1 8¼	4 11¾	2 1⅜	6 2⅜
·⅜	2 6⅞	1 3⅜	3 9⅝	1 8⅜	5 0⅛	2 1½	6 2¾
·½	2 7¼	1 3½	3 10⅛	1 8½	5 0½	2 1⅝	6 3⅛
·⅝	2 7⅝	1 3⅝	3 10⅝	1 8⅝	5 0⅞	2 1¾	6 3½
·¾	2 8	1 3¾	3 11¼	1 8¾	5 1¼	2 1⅞	6 3⅞
·⅞	2 8⅜	1 3⅞	3 11¾	1 8⅞	5 1⅝	2 2	6 4¼

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
2	2	6	4 1/4	2	9	8	0 3/4	3	4	9	9 1/4	3	11	11	5 3/4
2	2 1/8	6	4 3/8	2	9 1/8	8	1 1/8	3	4 1/8	9	9 3/8	3	11 1/8	11	6 1/8
2	2 1/4	6	5	2	9 1/4	8	1 1/4	3	4 1/4	9	10	3	11 1/4	11	6 3/8
2	2 3/8	6	5 1/8	2	9 3/8	8	1 3/8	3	4 3/8	9	10 3/8	3	11 3/8	11	6 5/8
2	2 1/2	6	5 3/8	2	9 1/2	8	2 1/4	3	4 1/2	9	10 1/4	3	11 1/2	11	7 1/4
2	2 5/8	6	6	2	9 5/8	8	2 1/2	3	4 5/8	9	11 3/8	3	11 5/8	11	7 3/8
2	2 3/4	6	6 3/4	2	9 3/4	8	2 7/8	3	4 3/4	9	11 1/4	3	11 3/4	11	8
2	2 7/8	6	6 3/4	2	9 7/8	8	3 1/4	3	4 7/8	9	11 7/8	3	11 7/8	11	8 3/8
2	3	6	7 1/8	2	10	8	3 5/8	3	5	10	0 1/8	4		11	8 3/4
2	3 1/8	6	7 1/4	2	10 1/8	8	4	3	5 1/8	10	0 1/4	4	0 1/8	11	9 1/8
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2	3 5/8	6	9	2	10 5/8	8	5 1/2	3	5 5/8	10	2	4	0 5/8	11	10 1/2
2	3 1/4	6	9 3/8	2	10 1/4	8	5 3/8	3	5 1/4	10	2 3/8	4	0 1/4	11	10 5/8
2	3 7/8	6	9 5/8	2	10 7/8	8	6 1/4	3	5 7/8	10	2 1/4	4	0 7/8	11	11 1/4
2	4	6	10	2	11	8	6 5/8	3	6	10	3 1/8	4	1	11	11 5/8
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2	5 5/8	7	2 7/8	3	0 5/8	8	11 1/8	3	7 5/8	10	7 7/8	4	2 5/8	12	4 3/8
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2	8 3/4	8		3	3 3/4	9	8 1/2	3	10 3/4	11	5	4	5 3/4	13	1 1/2
2	8 7/8	8	0 1/8	3	3 7/8	9	8 7/8	3	10 7/8	11	5 1/8	4	5 7/8	13	1 7/8

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
4	6	13	2 1/4	5	1	14	10 3/4	5	8	16	7 2/8	6	3	18	3 1/2
4	6 1/8	13	2 5/8	5	1 1/8	14	11 1/8	5	8 1/8	16	7 3/4	6	3 1/8	18	4 1/8
4	6 1/4	13	3	5	1 1/4	14	11 1/2	5	8 1/4	16	8	6	3 1/4	18	4 5/8
4	6 3/8	13	3 3/8	5	1 3/8	14	11 7/8	5	8 3/8	16	8 3/8	6	3 3/8	18	5
4	6 1/2	13	3 7/8	5	1 1/2	15	0 1/8	5	8 1/2	16	8 7/8	6	3 1/2	18	5 1/8
4	6 5/8	13	4 1/8	5	1 5/8	15	0 5/8	5	8 5/8	16	9 1/8	6	3 5/8	18	5 5/8
4	6 3/4	13	4 5/8	5	1 3/4	15	1	5	8 3/4	16	9 1/2	6	3 3/4	18	6
4	6 7/8	13	4 7/8	5	1 7/8	15	1 3/8	5	8 7/8	16	9 7/8	6	3 7/8	18	6 3/8
4	7	13	5 1/4	5	2	15	1 3/4	5	9	16	10 1/4	6	4	18	6 3/4
4	7 1/8	13	5 5/8	5	2 1/8	15	2 1/8	5	9 1/8	16	10 5/8	6	4 1/8	18	7 1/8
4	7 1/4	13	6 1/8	5	2 1/4	15	2 1/2	5	9 1/4	16	11	6	4 1/4	18	7 1/2
4	7 3/8	13	6 3/8	5	2 3/8	15	2 7/8	5	9 3/8	16	11 3/8	6	4 3/8	18	7 7/8
4	7 1/2	13	6 5/8	5	2 1/2	15	3 1/8	5	9 1/2	16	11 7/8	6	4 1/2	18	8 1/4
4	7 5/8	13	7	5	2 5/8	15	3 5/8	5	9 5/8	17	0 1/8	6	4 5/8	18	8 5/8
4	7 3/4	13	7 3/8	5	2 3/4	15	3 7/8	5	9 3/4	17	0 5/8	6	4 3/4	18	9
4	7 7/8	13	7 3/4	5	2 7/8	15	4 1/4	5	9 7/8	17	0 7/8	6	4 7/8	18	9 3/8
4	8	13	8 1/8	5	3	15	4 5/8	5	10	17	1 1/8	6	5	18	9 3/4
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4	8 3/4	13	10 3/8	5	3 3/4	15	6 7/8	5	10 3/4	17	3 3/8	6	5 3/4	18	11 7/8
4	8 7/8	13	10 1/4	5	3 7/8	15	7 1/4	5	10 7/8	17	3 1/4	6	5 7/8	19	0 1/4
4	9	13	11 1/8	5	4	15	7 5/8	5	11	17	4 1/8	6	6	19	0 5/8
4	9 1/8	13	11 1/2	5	4 1/8	15	8	5	11 1/8	17	4 1/2	6	6 1/8	19	1
4	9 1/4	13	11 7/8	5	4 1/4	15	8 3/8	5	11 1/4	17	4 7/8	6	6 1/4	19	1 3/8
4	9 3/8	14	0 1/8	5	4 3/8	15	8 3/4	5	11 3/8	17	5 1/4	6	6 3/8	19	1 7/8
4	9 1/2	14	0 1/2	5	4 1/2	15	9	5	11 1/2	17	5 5/8	6	6 1/2	19	2 1/4
4	9 5/8	14	0 7/8	5	4 5/8	15	9 3/8	5	11 5/8	17	6	6	6 5/8	19	2 1/2
4	9 3/4	14	1 1/4	5	4 3/4	15	9 3/4	5	11 3/4	17	6 3/8	6	6 3/4	19	2 7/8
4	9 7/8	14	1 5/8	5	4 7/8	15	10 1/8	5	11 7/8	17	6 5/8	6	6 7/8	19	3 1/4
4	10	14	2	5	5	15	10 1/2	6		17	7	6	7	19	3 5/8
4	10 1/8	14	2 3/8	5	5 1/8	15	10 7/8	6	0 1/8	17	7 3/8	6	7 1/8	19	3 7/8
4	10 1/4	14	2 7/8	5	5 1/4	15	11 1/4	6	0 1/4	17	7 3/4	6	7 1/4	19	4 1/2
4	10 3/8	14	3 1/8	5	5 3/8	15	11 5/8	6	0 3/8	17	8 1/8	6	7 3/8	19	4 5/8
4	10 1/2	14	3 5/8	5	5 1/2	16		6	0 1/2	17	8 1/2	6	7 1/2	19	5
4	10 5/8	14	3 7/8	5	5 5/8	16	0 1/8	6	0 5/8	17	8 7/8	6	7 5/8	19	5 3/8
4	10 3/4	14	4 1/4	5	5 3/4	16	0 1/4	6	0 3/4	17	9 1/4	6	7 3/4	19	5 7/8
4	10 7/8	14	4 5/8	5	5 7/8	16	1 1/8	6	0 7/8	17	9 5/8	6	7 7/8	19	6 1/4
4	11	14	5	5	6	16	1 1/2	6	1	17	10	6	8	19	6 1/2
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4	11 1/2	14	6 3/8	5	6 1/2	16	2 7/8	6	1 1/2	17	11 1/2	6	8 1/2	19	8
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5		14	7 7/8	5	7	16	4 3/8	6	2	18	0 7/8	6	9	19	9 3/8
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5	0 1/2	14	9 3/8	5	7 1/2	16	5 7/8	6	2 1/2	18	2 3/8	6	9 1/2	19	10 7/8
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5	0 3/4	14	10 1/4	5	7 3/4	16	6 5/8	6	2 3/4	18	3 1/4	6	9 3/4	19	11 5/8
5	0 7/8	14	10 3/8	5	7 7/8	16	7	6	2 7/8	18	3 1/2	6	9 7/8	20	

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
6	10	20	0 3/8	7	5	21	8 7/8	8		23	5 3/8	8	7	25	1 7/8
6	10 1/8	20	0 3/4	7	5 1/8	21	9 1/8	8	0 1/8	23	5 3/4	8	7 1/8	25	2 1/4
6	10 1/4	20	1 1/8	7	5 1/4	21	9 3/8	8	0 1/4	23	6 1/8	8	7 1/4	25	2 5/8
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6	11 7/8	20	5 7/8	7	6 7/8	22	2 3/8	8	1 7/8	23	10 5/8	8	8 7/8	25	7 3/8
7		20	6 1/4	7	7	22	2 3/4	8	2	23	11 1/4	8	9	25	7 3/4
7	0 1/8	20	6 5/8	7	7 1/8	22	3 1/8	8	2 1/8	23	11 5/8	8	9 1/8	25	8 1/8
7	0 1/4	20	7	7	7 1/4	22	3 1/2	8	2 1/4	24	0	8	9 1/4	25	8 1/2
7	0 3/8	20	7 3/8	7	7 3/8	22	3 7/8	8	2 3/8	24	0 3/8	8	9 3/8	25	8 7/8
7	0 1/2	20	7 7/8	7	7 1/2	22	4 1/4	8	2 1/2	24	0 3/4	8	9 1/2	25	9 1/4
7	0 5/8	20	8	7	7 5/8	22	4 5/8	8	2 5/8	24	1 1/8	8	9 5/8	25	9 5/8
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7	1	20	9 1/8	7	8	22	5 5/8	8	3	24	2 1/4	8	10	25	10 3/4
7	1 1/8	20	9 1/2	7	8 1/8	22	6	8	3 1/8	24	2 5/8	8	10 1/8	25	11 1/8
7	1 1/4	20	9 7/8	7	8 1/4	22	6 3/8	8	3 1/4	24	2 7/8	8	10 1/4	25	11 1/2
7	1 3/8	20	10 1/4	7	8 3/8	22	6 3/4	8	3 3/8	24	3 1/4	8	10 3/8	25	11 7/8
7	1 1/2	20	10 5/8	7	8 1/2	22	7 1/8	8	3 1/2	24	3 5/8	8	10 1/2	26	0 1/8
7	1 5/8	20	11	7	8 5/8	22	7 1/2	8	3 5/8	24	4	8	10 5/8	26	0 1/2
7	1 3/4	20	11 3/8	7	8 3/4	22	7 7/8	8	3 3/4	24	4 3/8	8	10 3/4	26	0 7/8
7	1 7/8	20	11 3/4	7	8 7/8	22	8 1/4	8	3 7/8	24	4 3/4	8	10 7/8	26	1 1/4
7	2	21	0 1/8	7	9	22	8 5/8	8	4	24	5 1/8	8	11	26	1 5/8
7	2 1/8	21	0 1/2	7	9 1/8	22	9	8	4 1/8	24	5 1/2	8	11 1/8	26	2
7	2 1/4	21	0 7/8	7	9 1/4	22	9 3/8	8	4 1/4	24	5 7/8	8	11 1/4	26	2 3/8
7	2 3/8	21	1 1/8	7	9 3/8	22	9 3/4	8	4 3/8	24	6 1/4	8	11 3/8	26	2 3/4
7	2 1/2	21	1 5/8	7	9 1/2	22	10 1/8	8	4 1/2	24	6 5/8	8	11 1/2	26	3 1/8
7	2 5/8	21	1 7/8	7	9 5/8	22	10 1/2	8	4 5/8	24	7	8	11 5/8	26	3 1/2
7	2 3/4	21	2 1/4	7	9 3/4	22	10 3/4	8	4 3/4	24	7 1/8	8	11 3/4	26	3 7/8
7	2 7/8	21	2 5/8	7	9 7/8	22	11 1/8	8	4 7/8	24	7 5/8	8	11 7/8	26	4 1/4
7	3	21	3	7	10	22	11 1/2	8	5	24	8	9		26	4 5/8
7	3 1/8	21	3 3/8	7	10 1/8	22	11 7/8	8	5 1/8	24	8 3/8	9	0 1/8	26	4 7/8
7	3 1/4	21	3 3/4	7	10 1/4	23	0 1/4	8	5 1/4	24	8 1/4	9	0 1/4	26	5 1/4
7	3 3/8	21	4 1/8	7	10 3/8	23	0 5/8	8	5 3/8	24	9	9	0 3/8	26	5 5/8
7	3 1/2	21	4 1/2	7	10 1/2	23	1	8	5 1/2	24	9 1/8	9	0 1/2	26	6
7	3 5/8	21	4 7/8	7	10 5/8	23	1 3/8	8	5 5/8	24	9 1/2	9	0 5/8	26	6 3/8
7	3 3/4	21	5 1/4	7	10 3/4	23	1 3/4	8	5 3/4	24	10 1/8	9	0 3/4	26	6 3/4
7	3 7/8	21	5 5/8	7	10 7/8	23	2 1/8	8	5 7/8	24	10 5/8	9	0 7/8	26	7 1/8
7	4	21	6	7	11	23	2 1/2	8	6	24	11	9	1	26	7 1/2
7	4 1/8	21	6 1/4	7	11 1/8	23	2 7/8	8	6 1/8	24	11 3/8	9	1 1/8	26	7 7/8
7	4 1/4	21	6 5/8	7	11 1/4	23	3 1/4	8	6 1/4	24	11 3/4	9	1 1/4	26	8 1/4
7	4 3/8	21	7	7	11 3/8	23	3 5/8	8	6 3/8	25	0 1/4	9	1 3/8	26	8 5/8
7	4 1/2	21	7 3/8	7	11 1/2	23	4	8	6 1/2	25	0 1/2	9	1 1/2	26	9
7	4 5/8	21	7 3/4	7	11 5/8	23	4 1/2	8	6 5/8	25	0 7/8	9	1 5/8	26	9 3/8
7	4 3/4	21	8 1/8	7	11 3/4	23	4 5/8	8	6 3/4	25	1 1/4	9	1 3/4	26	9 3/4
7	4 7/8	21	8 1/2	7	11 7/8	23	5	8	6 7/8	25	1 5/8	9	1 7/8	26	10 1/8

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
9	2	26	$10\frac{3}{8}$	9	$4\frac{1}{2}$	27	$5\frac{3}{4}$	9	7	28	$1\frac{1}{8}$	9	$9\frac{1}{2}$	28	$8\frac{3}{8}$
9	$2\frac{1}{8}$	26	$10\frac{3}{4}$	9	$4\frac{5}{8}$	27	$6\frac{1}{8}$	9	$7\frac{1}{8}$	28	$1\frac{1}{2}$	9	$9\frac{5}{8}$	28	$8\frac{1}{2}$
9	$2\frac{1}{4}$	26	$11\frac{1}{8}$	9	$4\frac{3}{4}$	27	$6\frac{1}{2}$	9	$7\frac{1}{4}$	28	$1\frac{7}{8}$	9	$9\frac{3}{4}$	28	$9\frac{1}{8}$
9	$2\frac{3}{8}$	26	$11\frac{1}{2}$	9	$4\frac{7}{8}$	27	$6\frac{7}{8}$	9	$7\frac{3}{8}$	28	$2\frac{1}{8}$	9	$9\frac{7}{8}$	28	$9\frac{1}{2}$
9	$2\frac{1}{2}$	26	$11\frac{7}{8}$	9	5	27	$7\frac{1}{4}$	9	$7\frac{1}{2}$	28	$2\frac{3}{8}$	9	10	28	$9\frac{7}{8}$
9	$2\frac{5}{8}$	27	$0\frac{1}{4}$	9	$5\frac{1}{8}$	27	$7\frac{5}{8}$	9	$7\frac{5}{8}$	28	$2\frac{7}{8}$	9	$10\frac{1}{8}$	28	$10\frac{1}{4}$
9	$2\frac{3}{4}$	27	$0\frac{5}{8}$	9	$5\frac{1}{4}$	27	8	9	$7\frac{3}{4}$	28	$3\frac{1}{4}$	9	$10\frac{1}{4}$	28	$10\frac{5}{8}$
9	$2\frac{7}{8}$	27	1	9	$5\frac{3}{8}$	27	$8\frac{3}{8}$	9	$7\frac{7}{8}$	28	$3\frac{5}{8}$	9	$10\frac{3}{8}$	28	11
9	3	27	$1\frac{3}{8}$	9	$5\frac{1}{2}$	27	$8\frac{3}{4}$	9	8	28	4	9	$10\frac{1}{2}$	28	$11\frac{3}{8}$
9	$3\frac{1}{8}$	27	$1\frac{3}{4}$	9	$5\frac{5}{8}$	27	9	9	$8\frac{1}{8}$	28	$4\frac{3}{8}$	9	$10\frac{5}{8}$	28	$11\frac{3}{4}$
9	$3\frac{1}{4}$	27	$2\frac{1}{8}$	9	$5\frac{3}{4}$	27	$9\frac{3}{8}$	9	$8\frac{1}{4}$	28	$4\frac{3}{4}$	9	$10\frac{3}{4}$	29	$0\frac{1}{8}$
9	$3\frac{3}{8}$	27	$2\frac{1}{2}$	9	$5\frac{7}{8}$	27	$9\frac{3}{4}$	9	$8\frac{3}{8}$	28	$5\frac{1}{8}$	9	$10\frac{7}{8}$	29	$0\frac{1}{2}$
9	$3\frac{1}{2}$	27	$2\frac{3}{4}$	9	6	27	$10\frac{1}{8}$	9	$8\frac{1}{2}$	28	$5\frac{1}{2}$	9	11	29	$0\frac{7}{8}$
9	$3\frac{5}{8}$	27	$3\frac{1}{8}$	9	$6\frac{1}{8}$	27	$10\frac{1}{2}$	9	$8\frac{5}{8}$	28	$5\frac{7}{8}$	9	$11\frac{1}{8}$	29	$1\frac{1}{8}$
9	$3\frac{3}{4}$	27	$3\frac{1}{2}$	9	$6\frac{1}{4}$	27	$10\frac{7}{8}$	9	$8\frac{3}{4}$	28	$6\frac{1}{8}$	9	$11\frac{1}{4}$	29	$1\frac{1}{2}$
9	$3\frac{7}{8}$	27	$3\frac{7}{8}$	9	$6\frac{3}{8}$	27	$11\frac{1}{4}$	9	$8\frac{7}{8}$	28	$6\frac{3}{8}$	9	$11\frac{3}{8}$	29	$1\frac{7}{8}$
9	4	27	$4\frac{1}{4}$	9	$6\frac{1}{2}$	27	$11\frac{5}{8}$	9	9	28	7	9	$11\frac{1}{2}$	29	$2\frac{1}{4}$
9	$4\frac{1}{8}$	27	$4\frac{1}{2}$	9	$6\frac{5}{8}$	28		9	$9\frac{1}{8}$	28	$7\frac{3}{8}$	9	$11\frac{5}{8}$	29	$2\frac{5}{8}$
9	$4\frac{1}{4}$	27	5	9	$6\frac{3}{4}$	28	$0\frac{3}{8}$	9	$9\frac{1}{4}$	28	$7\frac{5}{8}$	9	$11\frac{3}{4}$	29	3
9	$4\frac{3}{8}$	27	$5\frac{3}{8}$	9	$6\frac{7}{8}$	28	$0\frac{3}{4}$	9	$9\frac{3}{8}$	28	8	9	$11\frac{7}{8}$	29	$3\frac{3}{8}$

EXAMPLE.—The inner diameter of a hoop of $2\frac{1}{2}$ inches angled iron (fig. 1, p. 27) is to be 10 inches; what is the length of the bar required?

$10+2\frac{1}{2}=12\frac{1}{2}$, and the circumference for this (page 27) is 3 feet and $\frac{3}{8}$ths of an inch.

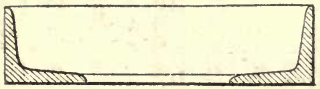
The preceding table is calculated upon the proportion of the diameter of a ring (of angled metal) to its circumference, being as 1 to 2.9312.

CIRCUMFERENCES OF ANGLED HOOPS,

From 6 *inches to* 10 *feet.*

ANGLED INSIDE.

Fig. 2.



NOTE.—The breadth of the inner flange must be taken from the outer diameter of the ring or hoop required.

Diam.	Circum.	Diam.	Circum.	Diam.	Circum.	Diam.	Circum.
INCH.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.
6.	1 8½	0 11	3 1⅝	1 4	4 6¾	1 9	5 11⅞
⅛	1 9	0 11⅛	3 2⅛	1 4⅛	4 7¼	1 9⅛	6 0⅜
¼	1 9⅜	0 11¼	3 2⅝	1 4¼	4 7⅞	1 9¼	6 0⅝
⅜	1 9⅝	0 11⅜	3 3	1 4⅜	4 8	1 9⅜	6 1⅛
½	1 10⅛	0 11½	3 3⅜	1 4½	4 8⅛	1 9½	6 1⅝
⅝	1 10⅜	0 11⅝	3 3⅞	1 4⅝	4 8⅞	1 9⅝	6 2
¾	1 10¾	0 11¾	3 4¼	1 4¾	4 9⅜	1 9¾	6 2⅜
⅞	1 11⅛	0 11⅞	3 4⅝	1 4⅞	4 9¾	1 9⅞	6 2⅞
7.	2	1	3 5⅛	1 5	4 10¼	1 10	6 3⅜
⅛	2 0⅜	1 0⅛	3 5½	1 5⅛	4 10⅝	1 10⅛	6 3¾
¼	2 0¾	1 0¼	3 6	1 5¼	4 11	1 10¼	6 4⅛
⅜	2 1⅛	1 0⅜	3 6⅜	1 5⅜	4 11⅜	1 10⅜	6 4⅝
½	2 1⅝	1 0½	3 6⅝	1 5½	4 11⅞	1 10½	6 5
⅝	2 2¼	1 0⅝	3 7⅛	1 5⅝	5 0⅜	1 10⅝	6 5½
¾	2 2½	1 0¾	3 7⅝	1 5¾	5 0¾	1 10¾	6 5⅞
⅞	2 3	1 0⅞	3 8⅛	1 5⅞	5 1⅛	1 10⅞	6 6¼
8.	2 3⅜	1 1	3 8½	1 6	5 1⅝	1 11	6 6¾
⅛	2 3⅞	1 1⅛	3 9	1 6⅛	5 2	1 11⅛	6 7⅛
¼	2 4½	1 1¼	3 9⅜	1 6¼	5 2⅜	1 11¼	6 7⅝
⅜	2 4⅝	1 1⅜	3 9¾	1 6⅜	5 2⅞	1 11⅜	6 8
½	2 5¼	1 1½	3 10¼	1 6½	5 3⅜	1 11½	6 8½
⅝	2 5¾	1 1⅝	3 10⅝	1 6⅝	5 3¾	1 11⅝	6 8⅞
¾	2 6	1 1¾	3 11	1 6¾	5 4¼	1 11¾	6 9⅜
⅞	2 6⅜	1 1⅞	3 11½	1 6⅞	5 4⅝	1 11⅞	6 9¾
9.	2 6⅞	1 2	4	1 7	5 5	2	6 10⅛
⅛	2 7¼	1 2⅛	4 0⅜	1 7⅛	5 5½	2 0⅛	6 10⅝
¼	2 7⅝	1 2¼	4 0¾	1 7¼	5 5⅞	2 0¼	6 11
⅜	2 8½	1 2⅜	4 1⅛	1 7⅜	5 6⅜	2 0⅜	6 11½
½	2 8½	1 2½	4 1⅝	1 7½	5 6¾	2 0½	6 11⅞
⅝	2 9	1 2⅝	4 2	1 7⅝	5 7¼	2 0⅝	7 0⅜
¾	2 9⅜	1 2¾	4 2½	1 7¾	5 7⅝	2 0¾	7 0¾
⅞	2 9⅞	1 2⅞	4 3	1 7⅞	5 8	2 0⅞	7 1⅛
10.	2 10½	1 3	4 3⅜	1 8	5 8½	2 1	7 1½
⅛	2 10⅜	1 3⅛	4 3¾	1 8⅛	5 8⅞	2 1⅛	7 2
¼	2 11⅛	1 3¼	4 4¼	1 8¼	5 9⅜	2 1¼	7 2⅜
⅜	2 11½	1 3⅜	4 4⅝	1 8⅜	5 9¾	2 1⅜	7 2¾
½	3	1 3½	4 5	1 8½	5 10⅛	2 1½	7 3⅛
⅝	3 0⅜	1 3⅝	4 5½	1 8⅝	5 10⅝	2 1⅝	7 3½
¾	3 0¾	1 3¾	4 6	1 8¾	5 11	2 1¾	7 4⅛
⅞	3 1¼	1 3⅞	4 6⅜	1 8⅞	5 11½	2 1⅞	7 4⅝

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
2	2	7	5	2	9	9	5	3	4	11	5	3	11	13	5
2	2⅛	7	5⅛	2	9⅛	9	5⅛	3	4⅛	11	5⅜	3	11⅛	13	5⅜
2	2¼	7	5⅜	2	9¼	9	5⅜	3	4¼	11	5⅞	3	11¼	13	5¾
2	2⅜	7	6¼	2	9⅜	9	6¼	3	4⅜	11	6¼	3	11⅜	13	6¼
2	2½	7	6⅜	2	9½	9	6⅜	3	4½	11	6⅜	3	11½	13	6⅝
2	2⅝	7	7⅛	2	9⅝	9	7¼	3	4⅝	11	7⅛	3	11⅝	13	7⅛
2	2¾	7	7⅝	2	9¾	9	7⅝	3	4¾	11	7½	3	11¾	13	7½
2	2⅞	7	8	2	9⅞	9	8	3	4⅞	11	8	3	11⅞	13	8
2	3	7	8⅛	2	10	9	8⅛	3	5	11	8⅜	4		13	8⅜
2	3⅛	7	8¼	2	10⅛	9	8¼	3	5⅛	11	8⅞	4	0⅛	13	8¾
2	3¼	7	9⅜	2	10¼	9	9¼	3	5¼	11	9¼	4	0¼	13	9¼
2	3⅜	7	9¾	2	10⅜	9	9¾	3	5⅜	11	9⅝	4	0⅜	13	9⅝
2	3½	7	10¼	2	10½	9	10¼	3	5½	11	10⅛	4	0½	13	10⅛
2	3⅝	7	10⅝	2	10⅝	9	10⅝	3	5⅝	11	10½	4	0⅝	13	10½
2	3¾	7	11	2	10¾	9	11	3	5¾	11	11	4	0¾	13	11
2	3⅞	7	11½	2	10⅞	9	11½	3	5⅞	11	11⅜	4	0⅞	13	11⅜
2	4	7	11⅞	2	11	9	11⅞	3	6	11	11¾	4	1	13	11¾
2	4⅛	8	0⅛	2	11⅛	10	0⅛	3	6⅛	12	0¼	4	1⅛	14	0¼
2	4¼	8	0¼	2	11¼	10	0⅜	3	6¼	12	0⅝	4	1¼	14	0⅝
2	4⅜	8	1⅛	2	11⅜	10	1⅛	3	6⅜	12	1⅛	4	1⅜	14	1
2	4½	8	1⅜	2	11½	10	1⅜	3	6½	12	1½	4	1½	14	1½
2	4⅝	8	2	2	11⅝	10	2	3	6⅝	12	2	4	1⅝	14	2
2	4¾	8	2⅛	2	11¾	10	2⅜	3	6¾	12	2⅜	4	1¾	14	2⅜
2	4⅞	8	2⅜	2	11⅞	10	2⅝	3	6⅞	12	2⅞	4	1⅞	14	2¾
2	5	8	3⅜	3		10	3⅛	3	7	12	3⅛	4	2	14	3⅛
2	5⅛	8	3¾	3	0⅛	10	3¾	3	7⅛	12	3⅜	4	2⅛	14	3⅜
2	5¼	8	4⅛	3	0¼	10	4⅛	3	7¼	12	4¼	4	2¼	14	4
2	5⅜	8	4⅜	3	0⅜	10	4½	3	7⅜	12	4½	4	2⅜	14	4½
2	5½	8	5	3	0½	10	5	3	7½	12	5	4	2½	14	5
2	5⅝	8	5⅛	3	0⅝	10	5⅜	3	7⅝	12	5⅜	4	2⅝	14	5⅜
2	5¾	8	5⅞	3	0¾	10	5⅞	3	7¾	12	5¾	4	2¾	14	5¾
2	5⅞	8	6¼	3	0⅞	10	6¼	3	7⅞	12	6¼	4	2⅞	14	6¼
2	6	8	6¾	3	1	10	6¾	3	8	12	6¾	4	3	14	6⅝
2	6⅛	8	7⅛	3	1⅛	10	7⅛	3	8⅛	12	7⅛	4	3⅛	14	7
2	6¼	8	7⅝	3	1¼	10	7½	3	8¼	12	7½	4	3¼	14	7½
2	6⅜	8	8	3	1⅜	10	8	3	8⅜	12	8	4	3⅜	14	8
2	6½	8	8⅛	3	1½	10	8⅜	3	8½	12	8⅜	4	3½	14	8⅜
2	6⅝	8	8⅝	3	1⅝	10	8⅝	3	8⅝	12	8⅝	4	3⅝	14	8¾
2	6¾	8	9¼	3	1¾	10	9¼	3	8¾	12	9¼	4	3¾	14	9¼
2	6⅞	8	9¾	3	1⅞	10	9¾	3	8⅞	12	9¾	4	3⅞	14	9⅝
2	7	8	10⅛	3	2	10	10⅛	3	9	12	10⅛	4	4	14	10
2	7⅛	8	10½	3	2⅛	10	10½	3	9⅛	12	10½	4	4⅛	14	10½
2	7¼	8	11	3	2¼	10	11	3	9¼	12	11	4	4¼	14	11
2	7⅜	8	11⅜	3	2⅜	10	11⅜	3	9⅜	12	11⅜	4	4⅜	14	11⅜
2	7½	8	11⅞	3	2½	10	11⅞	3	9½	12	11¾	4	4½	14	11¾
2	7⅝	9	0¼	3	2⅝	11	0¼	3	9⅝	13	0¼	4	4⅝	15	0¼
2	7¾	9	0¾	3	2¾	11	0¾	3	9¾	13	0¾	4	4¾	15	0⅝
2	7⅞	9	1⅛	3	2⅞	11	1⅛	3	9⅞	13	1⅛	4	4⅞	15	1
2	8	9	1⅝	3	3	11	1½	3	10	13	1½	4	5	15	1½
2	8⅛	9	2	3	3⅛	11	2	3	10⅛	13	2	4	5⅛	15	2
2	8¼	9	2⅜	3	3¼	11	2⅜	3	10¼	13	2⅜	4	5¼	15	2⅜
2	8⅜	9	2⅞	3	3⅜	11	2¾	3	10⅜	13	2⅞	4	5⅜	15	2¾
2	8½	9	3½	3	3½	11	3½	3	10½	13	3½	4	5½	15	3½
2	8⅝	9	3¾	3	3⅝	11	3¾	3	10⅝	13	3¾	4	5⅝	15	3⅜
2	8¾	9	4⅛	3	3¾	11	4⅛	3	10¾	13	4⅛	4	5¾	15	4
2	8⅞	9	4½	3	3⅞	11	4½	3	10⅞	13	4½	4	5⅞	15	4½

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
4	6	15	5	5	1	17	4 7/8	5	8	19	4 7/8	6	3	21	4 7/8
4	6 1/8	15	5 3/8	5	1 1/8	17	5 3/8	5	8 1/8	19	5 3/8	6	3 1/8	21	5 1/8
4	6 1/4	15	5 3/4	5	1 1/4	17	5 3/4	5	8 1/4	19	5 3/4	6	3 1/4	21	5 3/8
4	6 3/8	15	6 1/8	5	1 3/8	17	6 1/8	5	8 3/8	19	6 1/8	6	3 3/8	21	6 1/8
4	6 1/2	15	6 3/8	5	1 1/2	17	6 3/8	5	8 1/2	19	6 3/8	6	3 1/2	21	6 1/2
4	6 5/8	15	7	5	1 5/8	17	7	5	8 5/8	19	7	6	3 5/8	21	7
4	6 3/4	15	7 1/2	5	1 3/4	17	7 1/2	5	8 3/4	19	7 1/2	6	3 3/4	21	7 3/8
4	6 7/8	15	7 5/8	5	1 5/8	17	7 5/8	5	8 5/8	19	7 5/8	6	3 5/8	21	7 5/8
4	7	15	8 1/8	5	2	17	8 1/8	5	9	19	8 1/8	6	4	21	8 1/8
4	7 1/8	15	8 3/8	5	2 1/8	17	8 3/8	5	9 1/8	19	8 3/8	6	4 1/8	21	8 3/8
4	7 1/4	15	9 1/8	5	2 1/4	17	9 1/8	5	9 1/4	19	9 1/8	6	4 1/4	21	9 1/8
4	7 3/8	15	9 3/8	5	2 3/8	17	9 3/8	5	9 3/8	19	9 3/8	6	4 3/8	21	9 3/8
4	7 1/2	15	10	5	2 1/2	17	10	5	9 1/2	19	10	6	4 1/2	21	10
4	7 5/8	15	10 1/8	5	2 5/8	17	10 1/8	5	9 5/8	19	10 1/8	6	4 5/8	21	10 3/8
4	7 3/4	15	10 3/8	5	2 3/4	17	10 3/8	5	9 3/4	19	10 3/8	6	4 3/4	21	10 5/8
4	7 7/8	15	11 1/8	5	2 5/8	17	11 1/8	5	9 5/8	19	11 1/4	6	4 5/8	21	11 1/4
4	8	15	11 3/4	5	3	17	11 1/4	5	10	19	11 3/4	6	5	21	11 3/4
4	8 1/8	16	0 1/4	5	3 1/8	18	0 1/8	5	10 1/8	20	0 1/4	6	5 1/8	22	0 1/4
4	8 1/4	16	0 3/8	5	3 1/4	18	0 3/8	5	10 1/4	20	0 3/8	6	5 1/4	22	0 3/8
4	8 3/8	16	1	5	3 3/8	18	1	5	10 3/8	20	1	6	5 3/8	22	1
4	8 1/2	16	1 1/8	5	3 1/2	18	1 1/8	5	10 1/2	20	1 1/8	6	5 1/2	22	1 1/8
4	8 5/8	16	1 3/8	5	3 5/8	18	1 3/8	5	10 5/8	20	1 3/8	6	5 5/8	22	1 3/8
4	8 3/4	16	2 1/8	5	3 3/4	18	2 1/8	5	10 1/4	20	2 1/8	6	5 3/4	22	2 1/8
4	8 7/8	16	2 3/4	5	3 5/8	18	2 3/4	5	10 3/8	20	2 3/4	6	5 5/8	22	2 3/4
4	9	16	3 1/8	5	4	18	3 1/8	5	11	20	3 1/8	6	6	22	3 1/8
4	9 1/8	16	3 3/8	5	4 1/8	18	3 3/8	5	11 1/8	20	3 1/2	6	6 1/8	22	3 3/8
4	9 1/4	16	4	5	4 1/4	18	4	5	11 1/4	20	4	6	6 1/4	22	4
4	9 3/8	16	4 1/8	5	4 3/8	18	4 1/8	5	11 3/8	20	4 1/8	6	6 3/8	22	4 3/8
4	9 1/2	16	4 3/8	5	4 1/2	18	4 3/8	5	11 1/2	20	4 3/8	6	6 1/2	22	4 3/8
4	9 5/8	16	5 1/8	5	4 5/8	18	5 1/8	5	11 5/8	20	5 1/8	6	6 5/8	22	5 1/8
4	9 3/4	16	5 3/8	5	4 3/4	18	5 3/4	5	11 3/4	20	5 3/8	6	6 3/4	22	5 3/8
4	9 7/8	16	6 1/4	5	4 5/8	18	6 1/8	5	11 7/8	20	6 1/8	6	6 7/8	22	6 1/8
4	10	16	6 5/8	5	5	18	6 3/8	6		20	6 3/8	6	7	22	6 1/2
4	10 1/8	16	7	5	5 1/8	18	7	6	0 1/8	20	7	6	7 1/8	22	7
4	10 1/4	16	7 1/2	5	5 1/4	18	7 1/2	6	0 1/4	20	7 1/2	6	7 1/4	22	7 3/8
4	10 3/8	16	7 5/8	5	5 3/8	18	7 5/8	6	0 3/8	20	7 5/8	6	7 3/8	22	7 5/8
4	10 1/2	16	8 3/8	5	5 1/2	18	8 3/8	6	0 1/2	20	8 1/8	6	7 1/2	22	8 1/8
4	10 5/8	16	8 3/4	5	5 5/8	18	8 3/4	6	0 5/8	20	8 3/4	6	7 5/8	22	8 3/4
4	10 3/4	16	9 1/4	5	5 1/4	18	9 1/4	6	0 3/4	20	9 1/8	6	7 3/4	22	9 1/8
4	10 7/8	16	9 5/8	5	5 7/8	18	9 5/8	6	0 7/8	20	9 5/8	6	7 7/8	22	9 1/2
4	11	16	10	5	6	18	10	6	1	20	10	6	8	22	10
4	11 1/8	16	10 1/8	5	6 1/8	18	10 1/8	6	1 1/8	20	10 1/8	6	8 1/8	22	10 3/8
4	11 1/4	16	10 7/8	5	6 1/4	18	10 7/8	6	1 1/4	20	10 7/8	6	8 1/4	22	10 7/8
4	11 3/8	16	11 3/8	5	6 3/8	18	11 3/8	6	1 3/8	20	11 1/4	6	8 3/8	22	11 1/4
4	11 1/2	16	11 7/8	5	6 1/2	18	11 7/8	6	1 1/2	20	11 3/4	6	8 1/2	22	11 3/4
4	11 5/8	17	0 1/4	5	6 5/8	19	0 1/4	6	1 5/8	21	0 1/4	6	8 5/8	23	0 1/4
4	11 3/4	17	0 5/8	5	6 3/4	19	0 5/8	6	1 3/4	21	0 5/8	6	8 3/4	23	0 1/2
4	11 7/8	17	1	5	6 5/8	19	1	6	1 5/8	21	1	6	8 5/8	23	1
5		17	1 1/2	5	7	19	1 1/2	6	2	21	1 3/8	6	9	23	1 3/8
5	0 1/8	17	1 7/8	5	7 1/8	19	1 7/8	6	2 1/8	21	1 7/8	6	9 1/8	23	1 7/8
5	0 1/4	17	2 3/8	5	7 1/4	19	2 3/8	6	2 1/4	21	2 1/4	6	9 1/4	23	2 1/4
5	0 3/8	17	2 3/4	5	7 3/8	19	2 3/4	6	2 3/8	21	2 3/4	6	9 3/8	23	2 3/4
5	0 1/2	17	3 1/4	5	7 1/2	19	3 1/4	6	2 1/2	21	3 1/8	6	9 1/2	23	3 1/8
5	0 5/8	17	3 5/8	5	7 5/8	19	3 5/8	6	2 5/8	21	3 5/8	6	9 5/8	23	3 1/2
5	0 3/4	17	4	5	7 3/4	19	4	6	2 3/4	21	4	6	9 3/4	23	4
5	0 7/8	17	4 1/2	5	7 5/8	19	4 1/2	6	2 5/8	21	4 1/8	6	9 5/8	23	4 1/8

Diam.	Circum.	Diam.	Circum.	Diam.	Circum.	Diam.	Circum.
FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.	FT. IN.
6 10	23 4 7/8	7 5	25 4 3/4	8	27 4 1/4	8 7	29 4 1/4
6 10 1/8	23 5 1/8	7 5 1/8	25 5 1/4	8 0 1/8	27 5 1/4	8 7 1/8	29 5 1/8
6 10 1/4	23 5 3/8	7 5 1/4	25 5 5/8	8 0 1/4	27 5 5/8	8 7 1/4	29 5 5/8
6 10 3/8	23 6 1/8	7 5 3/8	25 6	8 0 3/8	27 6	8 7 3/8	29 6
6 10 1/2	23 6 1/2	7 5 1/2	25 6 1/2	8 0 1/2	27 6 1/4	8 7 1/2	29 6 1/8
6 10 5/8	23 7	7 5 5/8	25 7	8 0 5/8	27 6 7/8	8 7 5/8	29 6 7/8
6 10 3/4	23 7 3/8	7 5 3/4	25 7 3/8	8 0 3/4	27 7 1/8	8 7 3/4	29 7 3/8
6 10 7/8	23 7 7/8	7 5 7/8	25 7 7/8	8 0 7/8	27 7 1/2	8 7 7/8	29 7 1/4
6 11	23 8 1/4	7 6	25 8 1/4	8 1	27 8 1/4	8 8	29 8 1/8
6 11 1/8	23 8 3/4	7 6 1/8	25 8 5/8	8 1 1/8	27 8 5/8	8 8 1/8	29 8 5/8
6 11 1/4	23 9 1/8	7 6 1/4	25 9	8 1 1/4	27 9	8 8 1/4	29 9
6 11 3/8	23 9 1/2	7 6 3/8	25 9 1/2	8 1 3/8	27 9 1/4	8 8 3/8	29 9 1/4
6 11 1/2	23 10	7 6 1/2	25 10	8 1 1/2	27 9 7/8	8 8 1/2	29 9 7/8
6 11 5/8	23 10 3/8	7 6 5/8	25 10 3/8	8 1 5/8	27 10 3/8	8 8 5/8	29 10 3/8
6 11 3/4	23 10 7/8	7 6 3/4	25 10 3/4	8 1 3/4	27 10 3/4	8 8 3/4	29 10 3/4
6 11 7/8	23 11 1/4	7 6 7/8	25 11 1/4	8 1 7/8	27 11 1/4	8 8 7/8	29 11 1/8
7	23 11 5/8	7 7	25 11 5/8	8 2	27 11 5/8	8 9	29 11 5/8
7 0 1/8	24 0 1/8	7 7 1/8	26	8 2 1/8	28	8 9 1/8	30
7 0 1/4	24 0 1/2	7 7 1/4	26 0 1/2	8 2 1/4	28 0 1/4	8 9 1/4	30 0 1/4
7 0 3/8	24 1	7 7 3/8	26 1	8 2 3/8	28 0 7/8	8 9 3/8	30 0 7/8
7 0 1/2	24 1 3/8	7 7 1/2	26 1 3/8	8 2 1/2	28 1 3/8	8 9 1/2	30 1 1/2
7 0 5/8	24 1 7/8	7 7 5/8	26 1 3/4	8 2 5/8	28 1 1/2	8 9 5/8	30 1 3/4
7 0 3/4	24 2 1/4	7 7 3/4	26 2 1/4	8 2 3/4	28 2 1/8	8 9 3/4	30 2 1/8
7 0 7/8	24 2 5/8	7 7 7/8	26 2 5/8	8 2 7/8	28 2 5/8	8 9 7/8	30 2 5/8
7 1	24 3 1/8	7 8	26 3	8 3	28 3	8 10	30 3
7 1 1/8	24 3 1/2	7 8 1/8	26 3 1/2	8 3 1/8	28 3 1/2	8 10 1/8	30 3 1/4
7 1 1/4	24 4	7 8 1/4	26 4	8 3 1/4	28 3 7/8	8 10 1/4	30 3 7/8
7 1 3/8	24 4 3/8	7 8 3/8	26 4 3/8	8 3 3/8	28 4 1/8	8 10 3/8	30 4 1/4
7 1 1/2	24 4 7/8	7 8 1/2	26 4 3/4	8 3 1/2	28 4 1/2	8 10 1/2	30 4 1/2
7 1 5/8	24 5 1/4	7 8 5/8	26 5 1/4	8 3 5/8	28 5 1/8	8 10 5/8	30 5 1/4
7 1 3/4	24 5 5/8	7 8 3/4	26 5 5/8	8 3 3/4	28 5 5/8	8 10 3/4	30 5 5/8
7 1 7/8	24 6 1/8	7 8 7/8	26 6	8 3 7/8	28 6	8 10 7/8	30 6
7 2	24 6 1/2	7 9	26 6 1/4	8 4	28 6 1/4	8 11	30 6 1/8
7 2 1/8	24 7	7 9 1/8	26 6 7/8	8 4 1/8	28 6 7/8	8 11 1/8	30 6 5/8
7 2 1/4	24 7 3/8	7 9 1/4	26 7 3/8	8 4 1/4	28 7 3/8	8 11 1/4	30 7 1/4
7 2 3/8	24 7 7/8	7 9 3/8	26 7 3/4	8 4 3/8	28 7 7/8	8 11 3/8	30 7 7/8
7 2 1/2	24 8 1/4	7 9 1/2	26 8 1/4	8 4 1/2	28 8 1/4	8 11 1/2	30 8 1/8
7 2 5/8	24 8 5/8	7 9 5/8	26 8 5/8	8 4 5/8	28 8 5/8	8 11 5/8	30 8 5/8
7 2 3/4	24 9 1/8	7 9 3/4	26 9	8 4 3/4	28 9	8 11 3/4	30 9
7 2 7/8	24 9 1/2	7 9 7/8	26 9 1/2	8 4 7/8	28 9 1/2	8 11 7/8	30 9 1/2
7 3	24 10	7 10	26 9 7/8	8 5	28 9 7/8	9	30 9 7/8
7 3 1/8	24 10 3/8	7 10 1/8	26 10 3/8	8 5 1/8	28 10 3/8	9 0 1/8	30 10 1/4
7 3 1/4	24 10 7/8	7 10 1/4	26 10 3/4	8 5 1/4	28 10 3/4	9 0 1/4	30 10 3/4
7 3 3/8	24 11 1/4	7 10 3/8	26 11 1/4	8 5 3/8	28 11 1/4	9 0 3/8	30 11 1/8
7 3 1/2	24 11 5/8	7 10 1/2	26 11 5/8	8 5 1/2	28 11 5/8	9 0 1/2	30 11 5/8
7 3 5/8	25 0 1/8	7 10 5/8	27	8 5 5/8	29	9 0 5/8	31
7 3 3/4	25 0 1/2	7 10 3/4	27 0 1/2	8 5 3/4	29 0 1/4	9 0 3/4	31 0 1/4
7 3 7/8	25 1	7 10 7/8	27 0 7/8	8 5 7/8	29 0 7/8	9 0 7/8	31 0 7/8
7 4	25 1 3/8	7 11	27 1 3/8	8 6	29 1 3/8	9 1	31 1 1/2
7 4 1/8	25 1 3/4	7 11 1/8	27 1 7/8	8 6 1/8	29 1 3/4	9 1 1/8	31 1 3/4
7 4 1/4	25 2 1/4	7 11 1/4	27 2 1/4	8 6 1/4	29 2 1/8	9 1 1/4	31 2 1/8
7 4 3/8	25 2 5/8	7 11 3/8	27 2 5/8	8 6 3/8	29 2 5/8	9 1 3/8	31 2 5/8
7 4 1/2	25 3	7 11 1/2	27 3	8 6 1/2	29 3	9 1 1/2	31 3
7 4 5/8	25 3 1/2	7 11 5/8	27 3 1/4	8 6 5/8	29 3 1/2	9 1 5/8	31 3 1/2
7 4 3/4	25 4	7 11 3/4	27 3 7/8	8 6 3/4	29 3 7/8	9 1 3/4	31 3 7/8
7 4 7/8	25 4 3/8	7 11 7/8	27 4 3/8	8 6 7/8	29 4 3/8	9 1 7/8	31 4 1/4

Diam.		Circum.		Diam.		Circum.		Diam.		Circum.		Diam.		Circum.	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
9	2	31	$4\frac{3}{4}$	9	$4\frac{1}{4}$	32	$1\frac{1}{4}$	9	7	32	$9\frac{7}{8}$	9	$9\frac{1}{2}$	33	$6\frac{1}{2}$
9	$2\frac{1}{8}$	31	$5\frac{1}{8}$	9	$4\frac{3}{8}$	32	$1\frac{3}{4}$	9	$7\frac{1}{8}$	32	$10\frac{1}{4}$	9	$9\frac{5}{8}$	33	$6\frac{7}{8}$
9	$2\frac{1}{4}$	31	$5\frac{5}{8}$	9	$4\frac{3}{8}$	32	$2\frac{1}{8}$	9	$7\frac{1}{4}$	32	$10\frac{3}{4}$	9	$9\frac{3}{4}$	33	$7\frac{3}{8}$
9	$2\frac{3}{8}$	31	6	9	$4\frac{1}{2}$	32	$2\frac{1}{2}$	9	$7\frac{3}{8}$	32	$11\frac{1}{8}$	9	$9\frac{7}{8}$	33	$7\frac{7}{8}$
9	$2\frac{1}{2}$	31	$6\frac{1}{8}$	9	5	32	3	9	$7\frac{1}{2}$	32	$11\frac{1}{2}$	9	10	33	$8\frac{1}{8}$
9	$2\frac{5}{8}$	31	$6\frac{7}{8}$	9	$5\frac{1}{8}$	32	$3\frac{3}{8}$	9	$7\frac{5}{8}$	33		9	$10\frac{1}{8}$	33	$8\frac{1}{2}$
9	$2\frac{3}{4}$	31	$7\frac{1}{4}$	9	$5\frac{1}{4}$	32	$3\frac{7}{8}$	9	$7\frac{3}{4}$	33	$0\frac{3}{8}$	9	$10\frac{1}{4}$	33	9
9	$2\frac{7}{8}$	31	$7\frac{5}{8}$	9	$5\frac{3}{8}$	32	$4\frac{1}{4}$	9	$7\frac{7}{8}$	33	$0\frac{7}{8}$	9	$10\frac{3}{8}$	33	$9\frac{1}{2}$
9	3	31	$8\frac{1}{8}$	9	$5\frac{1}{2}$	32	$4\frac{3}{4}$	9	8	33	$1\frac{1}{4}$	9	$10\frac{1}{2}$	33	$9\frac{1}{4}$
9	$3\frac{1}{8}$	31	$8\frac{5}{8}$	9	$5\frac{5}{8}$	32	$5\frac{1}{4}$	9	$8\frac{1}{8}$	33	$1\frac{3}{4}$	9	$10\frac{5}{8}$	33	$10\frac{1}{4}$
9	$3\frac{1}{4}$	31	9	9	$5\frac{3}{4}$	32	$5\frac{1}{2}$	9	$8\frac{1}{4}$	33	$2\frac{1}{8}$	9	$10\frac{3}{4}$	33	$10\frac{3}{4}$
9	$3\frac{3}{8}$	31	$9\frac{3}{8}$	9	$5\frac{7}{8}$	32	6	9	$8\frac{3}{8}$	33	$2\frac{1}{2}$	9	$10\frac{7}{8}$	33	$11\frac{1}{8}$
9	$3\frac{1}{2}$	31	$9\frac{7}{8}$	9	6	32	$6\frac{3}{8}$	9	$8\frac{1}{2}$	33	3	9	11	33	$11\frac{1}{2}$
9	$3\frac{5}{8}$	31	$10\frac{1}{4}$	9	$6\frac{1}{8}$	32	$6\frac{7}{8}$	9	$8\frac{5}{8}$	33	$3\frac{3}{8}$	9	$11\frac{1}{8}$	34	
9	$3\frac{3}{4}$	31	$10\frac{3}{4}$	9	$6\frac{1}{4}$	32	$7\frac{1}{4}$	9	$8\frac{3}{4}$	33	$3\frac{7}{8}$	9	$11\frac{1}{4}$	34	$0\frac{3}{8}$
9	$3\frac{7}{8}$	31	$11\frac{1}{8}$	9	$6\frac{3}{8}$	32	$7\frac{3}{4}$	9	$8\frac{7}{8}$	33	$4\frac{1}{4}$	9	$11\frac{3}{8}$	34	$0\frac{7}{8}$
9	4	31	$11\frac{1}{2}$	9	$6\frac{1}{2}$	32	$8\frac{1}{8}$	9	9	33	$4\frac{3}{4}$	9	$11\frac{1}{2}$	34	$1\frac{1}{4}$
9	$4\frac{1}{8}$	32		9	$6\frac{5}{8}$	32	$8\frac{1}{2}$	9	$9\frac{1}{8}$	33	$5\frac{1}{8}$	9	$11\frac{5}{8}$	34	$1\frac{3}{4}$
9	$4\frac{1}{4}$	32	$0\frac{1}{8}$	9	$6\frac{3}{4}$	32	9	9	$9\frac{1}{4}$	33	$5\frac{1}{2}$	9	$11\frac{3}{4}$	34	$2\frac{1}{4}$
9	$4\frac{3}{8}$	32	$0\frac{3}{8}$	9	$6\frac{7}{8}$	32	$9\frac{3}{8}$	9	$9\frac{3}{8}$	33	6	9	$11\frac{7}{8}$	34	$2\frac{3}{4}$

EXAMPLE.—The outer diameter of a hoop of $2\frac{1}{2}$ inch angled iron (fig. 2, p. 32) is to be $12\frac{1}{4}$ inches; what is the required length of the hoop?

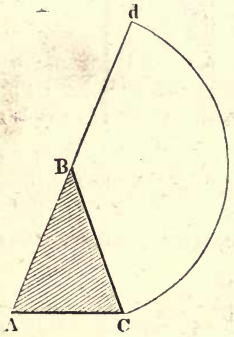
$12\frac{1}{2}-2\frac{1}{2}=10$, and the circumference for this (page 32) is 2 feet $10\frac{1}{4}$ inches.

The preceding table is calculated upon the proportion of the diameter of a ring (of angled metal) to its circumference, being as 1 to 3.4248.

CUTTING OF BOILER PLATES, MATERIALS FOR ROOFING, AND THE COVERING OF SOLIDS.

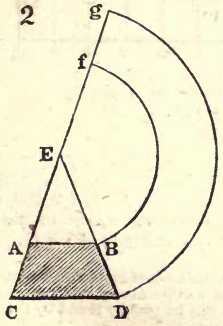
Under this head it is thought necessary to illustrate only such of the cases as occur in general practice.

1. *To ascertain the covering for a cone*, A B C, *fig.* 1.



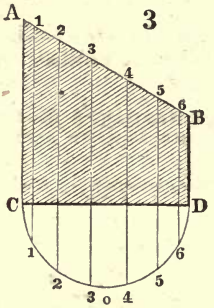
From B as a centre, with the radius B C, describe the arc of a circle C d; make C d equal in length to the circumference of the base of the cone (which can be found by a reference to the table of the circumferences of a circle) and join B d; then the figure determined by B d C will be that of the required surface of the cone.

2. *To ascertain the surface of an envelope for a frustum of a cone*, A B C D, *fig.* 2.



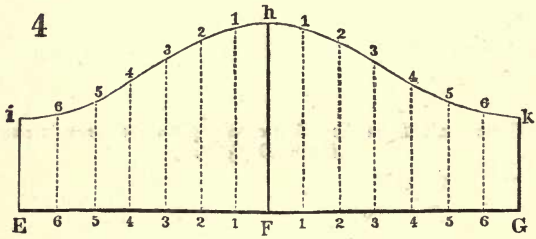
Produce A C, B D, until they meet at E; then from E as a centre, with the radii E A and E C, describe the arcs B f and D g, and set off D g equal to the circumference of the base of the cone, and join E g; then the figure B D f g, will be that of the required surface of the frustum.

3. *To ascertain the surface of an envelope for a given cylinder,* A B C D, *fig.* 3.



Let A B C D be the given cylinder, having one of its ends at an angle to its sides, as A B.

Upon the base C D draw a semicircle, which divide into a number of equal parts (the more there are the more correct will be the result required), as 1, 2, 3, 4, 5, and 6; from the points draw the lines 1 1, 2 2, 3 3, &c., parallel to the plane of the cylinder; then set off, as in *fig.* 4, the line E F G, equal in length to the circumfer-



ence of the base of the cylinder, or twice the semicircle C o D; upon E F G mark off on each side of F the same number of equal distances as in the semicircle C o D, and draw lines, as F h, 1 1, 2 2, 3 3, &c., perpendicular to E F G; make F h equal in length to A C, and E i, G k, each equal to D B, and also each of the perpendiculars equal to the lines bearing the same figures, as 1 1, 2 2, 3 3, &c.; then a line traced through these points will form a side of the envelope, the whole of which is contained in the figure E i k G.

NOTE.—This problem is a very useful one to boiler-makers and coppersmiths who are in the habit of making pipes to join each other at any given angle—the shape of the plate of metal for making which will be readily found by the foregoing rule.

COVERING OF CIRCULAR ROOFS, ETC.

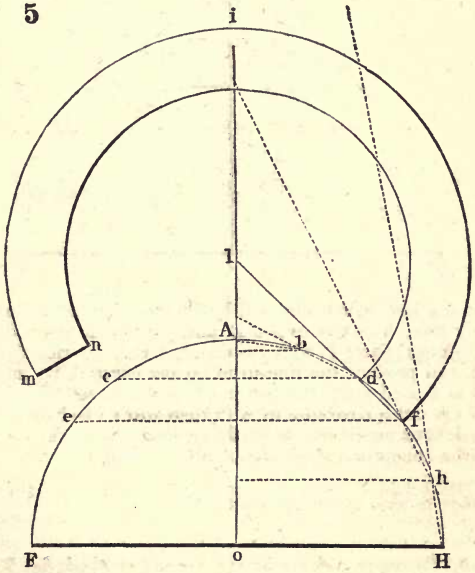
Circular roofs may be covered upon two different principles:

First Method.—Assume the vertical section or axis to be divided into a number of small equal parts, and the roof or figure cut by planes through the points of division parallel to the base, and then consider the portions of the figure as so many frustums of cones; the surface of each frustum can then be determined as by rule 2, p. 37.

Second Method.—Divide the circumference of the base into a number of small equal parts, and assume sections to be made perpendicularly through these points of division; then estimate the surface of each of these divisions on the surface of the figure.

4. *To cover a dome by the first method.*

Let F A H, *fig.* 5, be the section of a dome; draw the axis o A



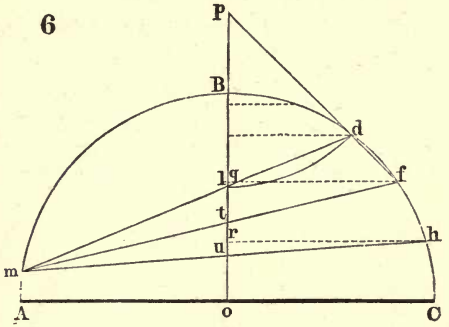
produced to i; divide the curve of one half the figure into equal parts, as b, d, f, and h; the width of these divisions being the width required by that of the material with which the dome is to be covered.

Produce H h, h f, f d, d b, and b A severally, until they intersect the axis o A i; then (for example), from the point l, with the radii l f and l d, describe the curves f m, d n; then set off, as by rule 2, the length of f m equal to the circumference of the base f e, and d f m n will be the form of the course to cover that of d c e f.

In the same manner, the form of the coverings for the other portions can be found.

It will be observed that the finding of the centres for the curves of the lower courses of a dome of large diameter will be inconvenient from the distances being frequently inaccessible with ordinary means. The method, therefore, of finding these distances, when they are inconveniently accessible, is as follows:

Let A B C, *fig.* 6, be the vertical section of a dome, and suppose



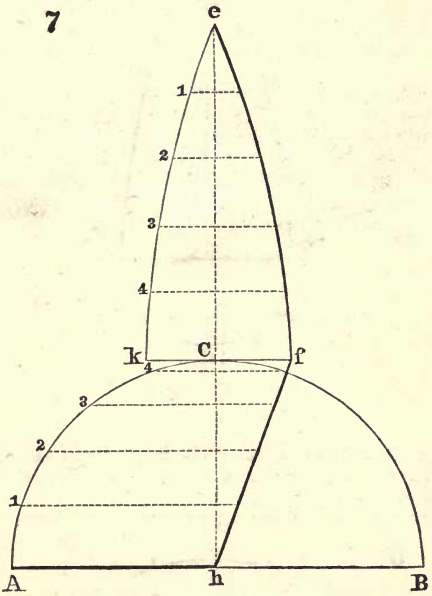
d f to be the last course attained by construction according to the preceding rule, draw the axis o B, and produce it and f d to meet in P; from the centre P, with the distance P d, describe the arc d l; join d l, and produce the line to m on the curve A B; at m, draw m f and m h, and mark the points of their intersection of o B by t u; draw f p and h r parallel to A C, then will f l be half the length, l t the height or versed sine of the first course, and h r the half length, and r u the height or versed sine of the remaining course.

NOTE.—The height or versed sine corresponding to a given length of any of these courses, is found as shown in problem 9, page 45.

5. *To cover a dome by the second method, fig.* 7.

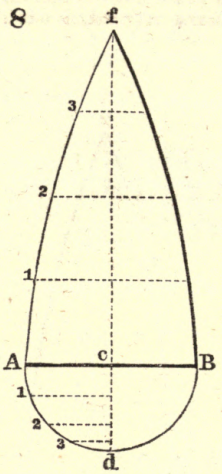
Let A B C, *fig.* 7, be the section of a dome; then the length of a course of covering is obtained as follows: the length of the course C e is equal to the curve A C, and k f the breadth of it; join f h, and the lines 1, 2, 3, and 4 intersected thereby will be the half

breadths (for the vertical C h) of the course at the corresponding lines on C e, through which points a line can be drawn, which will give the form of the course required, as e k f.

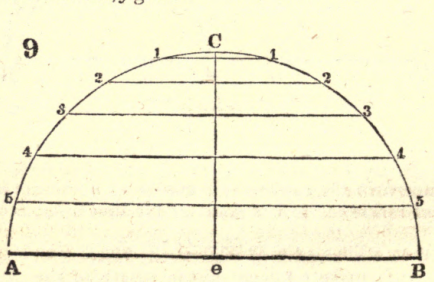


6. *To ascertain the outline of a course of covering to a dome without reference to a section of the dome, fig.* 8 (p. 42).

Let A B be the breadth of the course; bisect it at c by the perpendicular d f; make c f equal to the length of the arc from the base of the dome to the top of it (which may be found either by measurement or calculation); divide the semicircle A d B into any number of equal parts, and draw the sines parallel to A B; divide c f into the same number of equal parts, and draw lines parallel to A B; make ordinates on each side of c f, as 1, 2, and 3, equal to the sines of A d B, and a curve drawn through their terminations, 1, 2, and 3, on both sides, will give the outline of the course.



7. *To ascertain by calculation the breadths of the courses of covering to a dome when in vertical sections and of a given or required width, fig.* 9.



Let A B C be the vertical section of a dome, and the required width of the courses to be $\frac{1}{24}$th of the circumference of the base.

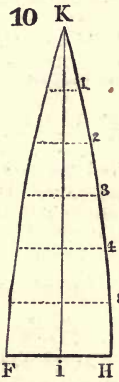
Bisect A B in e, and erect a perpendicular, e C; divide the arc B C into a number of equal parts (six), and from the points 1, 2, 3, &c., draw lines parallel to A B; and as the breadth of the courses

at A B is to be $\frac{1}{24}$th of the circumference thereof, it follows that the breadth at 1 1, 2 2, &c., will also be $\frac{1}{24}$th of the circumference at these points; the diameter then being ascertained at these points, the operation is as follows:

Assume A B to be 12 feet in diameter,
and that 5 5 is by measurement 11.6
4 4 " " 10.4
3 3 " " 8.5
2 2 " " 6.
and 1 1 " " 3.1

Then the circumference at A B will be 12×3.1416, or 37.6992; hence, the breadth of a course at that line will be $37.6992 \div 24$, or 1.57 feet. The circumference at 5 5 will be 11.6×3.146, or 36.446, and the breadth of the course at the line will be $36.446 \div 24$, or 1.52 feet.

In like manner, the circumference at 4 4, 3 3, 2 2, 1 1, will be 32.673, 26.704, 18.850, and 9.739, and the breadth of the curves respectively, 1.36 and 1.11 feet, .785 and .405 inches.



Draw F H, *fig.* 10, equal to $\frac{1}{24}$th of the circumference of A B (*fig.* 9); bisect it at i by a perpendicular line i K, and set off thereon six equal distances, 5, 4, 3, 2, and 1, the same as upon the dome, and make the breadths at these points equal to those found by calculation; then a line drawn through the points will have the outside of the course required.

APPLICATION OF THE PRECEDING RULES TO THE SHELLS OF CYLINDRICAL BOILERS AND FLUES.

The courses of a cylindrical boiler or flue, when tapered, are a series of conic frustums inserted into each other, the height of each being the breadth of the plate of the course; the diameters at the large and small ends being respectively equal to those of the external and internal diameters of the boiler or flue.

9. *To ascertain how to cut a template for the tapering courses of a boiler or flue.*

Suppose it is required to build a cylindrical boiler 5 feet in diameter, the shell of which is to be made in four plates of equal length, of a breadth of 22 inches, and $\frac{3}{8}$ths of an inch thick.

NOTE.—In referring to the length or breadth of a boiler, or any riveted plate, the measurements are taken and given from the centre of the rivet holes.

The first operation is to find the vertex of the cone of which the course is a frustum, the rule for which is as follows:

Multiply the breadth of the course by half the diameter of the boiler; divide their product by the thickness of the metal, and the quotient will be the length of the slant edge of the course.

Thus, as $\frac{3}{8}$ (.375) : 30 in. :: 22 in. : slant edge of cone

30

.375)660

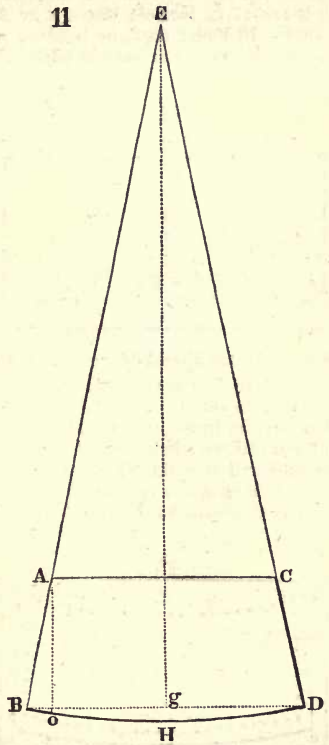
1760 inches.

Now as the radius with which the template is to be drawn is of an inconvenient or impracticable length, the best method to find the curve is to find the versed sine corresponding to the curve, for which proceed as follows:

In order to delineate the necessary diagram, *fig.* 11, first obtain the following elements, viz., the radius E B, the distances B D and A B, and which are thus found:

E B, as above shown, is 1760 inches, B D is the fourth of the circumference of the shell, which is to consist of four plates, like to A C D B; consequently, B g is one half of one fourth of the circumference of the shell; thus, the diameter of the boilers being 5 feet, the circumference is 188.5 inches; then 188.5÷4=47.12, and 47.12 ÷2=23.56 inches; A o being equal to the width of the course, it is, as here given, 22 inches.

11



E B is the radius, B D the chord, and g H the versed sine of the arc first required. (*See Note, page* 40.) The rule to obtain which is, from the square of the radius (E B) subtract the square of half the chord of the arc (g B), and the square root of the remainder subtracted from the radius will give the versed sine (g H).

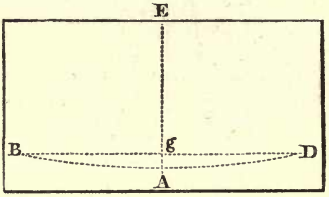
ILLUSTRATION.—The radius is 1760, and half the chord of the arc is 23.56 inches.

Then 1760	23.56
1760	23.56
3097600=E B²	555.0736=g B²
555.0736	

3097044.9264, the square root of which is 1759.84 =E g, and 1759.84 subtracted from 1760=.16=g H the versed sine.

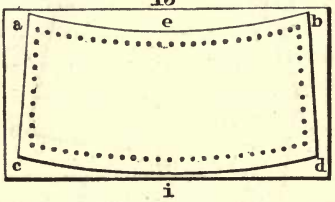
Draw upon a plate, *fig.* 12 (from which a template is to be made), a straight line as B D=47.12 inches; bisect it by A E, and set off g A, the versed sine=.16 inch; then, by bending a batten around the points B A D, the curve of the outside edge of the course may be readily drawn.

12



As the diameter of the small end of the required frustum is twice the thickness of the plate less than the larger, or $(60-\frac{3}{8}\times 2)$ $59\frac{1}{4}$ inches, the circumference will be $59\frac{1}{4}\times 3.1416=186.14$; hence the length of the plate on the inside will be $186.14\div 4=46.53$ inches. The distance between the rivet holes is to be about 2 inches, consequently the templates will contain 23 divisions in the length and 11 in the breadth. The template can now be drawn, and will be as shown in *fig.* 13, viz., a b=46.53 inches, c d=47.12 inches, and e i =22 inches.

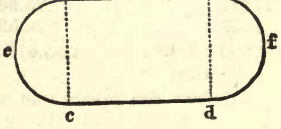
13



When the flue is of the form of the following figure.

Assume a b, c d, each=12 inches in length, a c=9 inches in diameter, and that a course is to be 18 inches wide and $\frac{1}{4}$ of an inch in thickness; distance between the rivet holes 2 inches.

14



in. in. in.
Then as $\frac{1}{4}$: $4\frac{1}{2}$ :: 18 : slant of edge of cone, or radius of circle of the outer edge of the template.

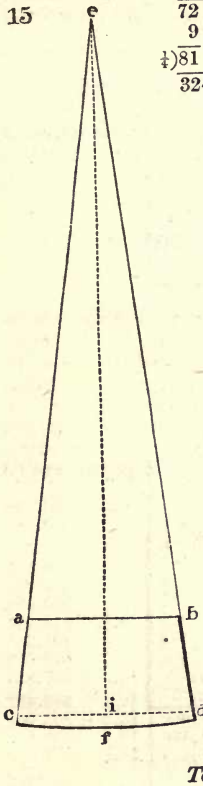
$4\frac{1}{2}$

72

9

$\frac{1}{4})\overline{81}$

324 inches.



The diameter of the semicircular ends being 9 inches, the circumference of each part will be $9 \times 3.1416 \div 2 = 28.2744 \div 2 = 14.13$ inches for the larger end, and for the versed sine proceed as before shown. 324 being the radius of the arc, and $14.13 \div 2 = 7.06$ half the chord of the arc; therefore,

324	7.06
324	7.06

$\overline{104976} = e\,c^2$, $\overline{49.8436} = c\,i^2$,

and $104976 - 49.8436 = 104926.2$, the square root of which is 323.9, which, when subtracted from 324, gives .1 = f i, the versed sine of arc c f d of outer edge of template, *fig.* 15.

The diameter of the small side of the semicircular ends will be $(9 - \overline{\frac{1}{4} \times 2})$ $8\frac{1}{2}$ inches, consequently, the circumference of each will be $\frac{8\frac{1}{2} \times 3.1416}{2} = \frac{26.70}{2} = 13.35$ inches.

NOTE.—In these examples it will be perceived that the length of the chord is measured upon the plate from the length of the curve of the arc; this is not strictly correct, as the chord is shorter than the arc; this difference, however, is so little in ordinary cases, that is, the example, p. 45, being but .16 of an inch, that it was considered an unnecessary element to bring into the calculation for ordinary practice, inasmuch as it involves a complexity at variance with the purpose of these rules. In cases, however, requiring exactness of dimension, the manner of proceeding is as follows:

To find the chord of the arc.

Multiply the versed sine by 2, and subtract the product from the diameter; then subtract the square of the remainder from the square of the diameter, and the square root of the remainder will give the chord required.

Or, $\sqrt{(v \times 2 - d)^2 - d^2} = C$.

WROUGHT IRON.

WROUGHT IRON expands $\frac{1}{143000}$ of its length for one degree of heat; will bear on a square inch, without permanent alteration, 17,800 lbs., and an extension in length of $\frac{1}{1400}$; its cohesive force is diminished $\frac{1}{3000}$ by an increase of 1 degree of heat.

Compared with cast iron, its strength is 1.12 *times, its extensibility* 0.86 *times, and its stiffness* 1.3 *times.*

WEIGHT OF SQUARE ROLLED IRON,

From $\frac{1}{16}$th of an inch to 12 *inches square.*

ONE FOOT IN LENGTH.

Size in inches.	Weight in pounds.	Size in inches.	Weight in pounds.	Size in inches.	Weight in pounds.	Size in inches.	Weight in pounds.
$\frac{1}{16}$	.0132	2. $\frac{3}{16}$	19.063	5. $\frac{5}{16}$	106.931	8. $\frac{7}{16}$	266.193
$\frac{1}{8}$	.0528	2. $\frac{1}{4}$	21.122	5. $\frac{3}{8}$	111.737	9.	273.744
$\frac{3}{16}$	.1188	2. $\frac{5}{16}$	23.287	5. $\frac{7}{16}$	116.647	9. $\frac{1}{8}$	281.401
$\frac{1}{4}$	.2112	2. $\frac{3}{8}$	25.558	6.	121.164	9. $\frac{1}{4}$	289.163
$\frac{5}{16}$	.3300	2. $\frac{7}{16}$	27.934	6. $\frac{1}{8}$	126.786	9. $\frac{3}{8}$	297.031
$\frac{3}{8}$	.4753	3.	30.416	6. $\frac{1}{4}$	132.014	9. $\frac{1}{2}$	305.004
$\frac{7}{16}$	.6469	3. $\frac{1}{8}$	33.003	6. $\frac{3}{8}$	137.347	9. $\frac{5}{8}$	313.084
$\frac{1}{2}$	.8449	3. $\frac{1}{4}$	35.697	6. $\frac{1}{2}$	142.786	9. $\frac{3}{4}$	321.269
$\frac{9}{16}$	1.069	3. $\frac{3}{8}$	38.495	6. $\frac{5}{8}$	148.331	9. $\frac{7}{8}$	329.559
$\frac{5}{8}$	1.320	3. $\frac{1}{2}$	41.400	6. $\frac{3}{4}$	153.981	10.	337.955
$\frac{11}{16}$	1.597	3. $\frac{5}{8}$	44.410	6. $\frac{7}{8}$	159.737	10. $\frac{1}{8}$	346.457
$\frac{3}{4}$	1.901	3. $\frac{3}{4}$	47.525	7.	165.598	10. $\frac{1}{4}$	355.064
$\frac{13}{16}$	2.231	3. $\frac{7}{8}$	50.746	7. $\frac{1}{8}$	171.565	10. $\frac{3}{8}$	363.777
$\frac{7}{8}$	2.587	4.	54.073	7. $\frac{1}{4}$	177.638	10. $\frac{1}{2}$	372.597
$\frac{15}{16}$	2.970	4. $\frac{1}{8}$	57.505	7. $\frac{3}{8}$	183.816	10. $\frac{5}{8}$	381.520
1.	3.380	4. $\frac{1}{4}$	61.043	7. $\frac{1}{2}$	190.100	10. $\frac{3}{4}$	390.550
1. $\frac{1}{8}$	4.277	4. $\frac{3}{8}$	64.687	7. $\frac{5}{8}$	196.489	10. $\frac{7}{8}$	399.685
1. $\frac{1}{4}$	5.281	4. $\frac{1}{2}$	68.436	7. $\frac{3}{4}$	202.984	11.	408.926
1. $\frac{3}{8}$	6.389	4. $\frac{5}{8}$	72.291	7. $\frac{7}{8}$	209.585	11. $\frac{1}{8}$	418.272
1. $\frac{1}{2}$	7.604	4. $\frac{3}{4}$	76.251	8.	216.291	11. $\frac{1}{4}$	427.725
1. $\frac{5}{8}$	8.924	4. $\frac{7}{8}$	80.317	8. $\frac{1}{8}$	223.103	11. $\frac{3}{8}$	437.282
1. $\frac{3}{4}$	10.350	5.	84.489	8. $\frac{1}{4}$	230.021	11. $\frac{1}{2}$	446.946
1. $\frac{7}{8}$	11.881	5. $\frac{1}{8}$	88.766	8. $\frac{3}{8}$	237.044	11. $\frac{5}{8}$	456.715
2.	13.518	5. $\frac{1}{4}$	93.149	8. $\frac{1}{2}$	244.173	11. $\frac{3}{4}$	466.589
2. $\frac{1}{8}$	15.262	5. $\frac{3}{8}$	97.637	8. $\frac{5}{8}$	251.407	11. $\frac{7}{8}$	476.570
2. $\frac{1}{4}$	17.109	5. $\frac{1}{2}$	102.232	8. $\frac{3}{4}$	258.747	12.	486.656

WEIGHT OF ROUND ROLLED IRON AND SHAFTING,

From $\frac{1}{16}$th of an inch to 30 inches diameter.

ONE FOOT IN LENGTH.

Diameter in inches.	Weight in pounds.	Diameter in inches.	Weight in pounds.	Diameter in inches.	Weight in pounds.
$\frac{1}{16}$	.0104	4. $\frac{3}{8}$	50.803	9. $\frac{5}{8}$	245.889
$\frac{1}{8}$	.0415	4. $\frac{1}{2}$	53.748	9. $\frac{3}{4}$	252.317
$\frac{1}{16}$	.0933	4. $\frac{5}{8}$	56.775	9. $\frac{7}{8}$	258.828
$\frac{1}{4}$	.1659	4. $\frac{3}{4}$	59.886	10.	265.422
$\frac{5}{16}$	.2592	4. $\frac{7}{8}$	63.079	10. $\frac{1}{8}$	272.190
$\frac{3}{8}$	.3733	5.	66.355	10. $\frac{1}{4}$	278.859
$\frac{7}{16}$	.5080	5. $\frac{1}{8}$	69.715	10. $\frac{3}{8}$	285.702
$\frac{1}{2}$	.6636	5. $\frac{1}{4}$	73.157	10. $\frac{1}{2}$	292.628
$\frac{9}{16}$	.8398	5. $\frac{3}{8}$	76.682	10. $\frac{5}{8}$	299.636
$\frac{5}{8}$	1.037	5. $\frac{1}{2}$	80.290	10. $\frac{3}{4}$	306.729
$\frac{11}{16}$	1.255	5. $\frac{5}{8}$	83.981	10. $\frac{7}{8}$	313.904
$\frac{3}{4}$	1.493	5. $\frac{3}{4}$	87.755	11.	321.162
$\frac{13}{16}$	1.752	5. $\frac{7}{8}$	91.612	11. $\frac{1}{8}$	328.502
$\frac{7}{8}$	2.032	6.	95.552	11. $\frac{1}{4}$	335.926
$\frac{15}{16}$	2.333	6. $\frac{1}{8}$	99.575	11. $\frac{3}{8}$	343.432
1.	2.654	6. $\frac{1}{4}$	103.681	11. $\frac{1}{2}$	351.022
1. $\frac{1}{8}$	3.359	6. $\frac{3}{8}$	107.869	11. $\frac{5}{8}$	358.694
1. $\frac{1}{4}$	4.147	6. $\frac{1}{2}$	112.140	11. $\frac{3}{4}$	366.449
1. $\frac{3}{8}$	5.028	6. $\frac{5}{8}$	116.505	11. $\frac{7}{8}$	374.288
1. $\frac{1}{2}$	5.922	6. $\frac{3}{4}$	120.943	12.	382.208
1. $\frac{5}{8}$	7.009	6. $\frac{7}{8}$	125.463	12. $\frac{1}{8}$	390.212
1. $\frac{3}{4}$	8.129	7.	130.057	12. $\frac{1}{4}$	398.300
1. $\frac{7}{8}$	9.331	7. $\frac{1}{8}$	134.753	12. $\frac{3}{8}$	406.470
2.	10.617	7. $\frac{1}{4}$	139.522	12. $\frac{1}{2}$	414.722
2. $\frac{1}{8}$	11.985	7. $\frac{3}{8}$	144.375	12. $\frac{5}{8}$	423.059
2. $\frac{1}{4}$	13.437	7. $\frac{1}{2}$	149.300	12. $\frac{3}{4}$	431.477
2. $\frac{3}{8}$	14.971	7. $\frac{5}{8}$	154.318	12. $\frac{7}{8}$	439.979
2. $\frac{1}{2}$	16.589	7. $\frac{3}{4}$	159.419	13.	448.564
2. $\frac{5}{8}$	18.259	7. $\frac{7}{8}$	164.603	13. $\frac{1}{8}$	457.232
2. $\frac{3}{4}$	20.073	8.	169.870	13. $\frac{1}{4}$	465.982
2. $\frac{7}{8}$	21.939	8. $\frac{1}{8}$	175.220	13. $\frac{3}{8}$	474.816
3.	23.888	8. $\frac{1}{4}$	180.653	13. $\frac{1}{2}$	483.732
3. $\frac{1}{8}$	25.920	8. $\frac{3}{8}$	186.169	13. $\frac{5}{8}$	492.732
3. $\frac{1}{4}$	28.035	8. $\frac{1}{2}$	191.767	13. $\frac{3}{4}$	501.814
3. $\frac{3}{8}$	30.233	8. $\frac{5}{8}$	197.449	13. $\frac{7}{8}$	510.980
3. $\frac{1}{2}$	32.514	8. $\frac{3}{4}$	203.214	14.	520.228
3. $\frac{5}{8}$	34.878	8. $\frac{7}{8}$	209.061	14. $\frac{1}{8}$	529.559
3. $\frac{3}{4}$	37.325	9.	214.992	14. $\frac{1}{4}$	538.973
3. $\frac{7}{8}$	39.855	9. $\frac{1}{8}$	221.005	14. $\frac{3}{8}$	548.470
4.	42.468	9. $\frac{1}{4}$	227.102	14. $\frac{1}{2}$	558.050
4. $\frac{1}{8}$	45.163	9. $\frac{3}{8}$	233.281	14. $\frac{5}{8}$	567.713
4. $\frac{1}{4}$	47.942	9. $\frac{1}{2}$	239.544	14. $\frac{3}{4}$	577.459

Diameter in inches.	Weight in pounds.	Diameter in inches.	Weight in pounds.	Diameter in inches.	Weight in pounds.
14.⅞	587.288	20.	1061.689	25.¼	1692.232
15.	597.200	20.¼	1088.397	25.½	1725.908
15.¼	617.273	20.½	1115.437	25.¾	1759.915
15.½	637.677	20.¾	1142.809	26.	1794.254
15.¾	658.413	21.	1170.512	26.¼	1828.925
16.	679.481	21.¼	1198.547	26.½	1863.927
16.¼	700.881	21.½	1226.915	26.¾	1899.262
16.½	722.612	21.¾	1255.613	27.	1934.928
16.¾	744.675	22.	1284.644	27.¼	1970.926
17.	767.070	22.¼	1313.006	27.½	2007.256
17.¼	789.797	22.½	1343.700	27.¾	2043.917
17.½	812.855	22.¾	1373.726	28.	2080.910
17.¾	836.246	23.	1404.083	28.¼	2118.235
18.	859.968	23.¼	1434.773	28.½	2155.892
18.¼	884.022	23.½	1465.794	28.¾	2193.880
18.½	908.408	23.¾	1487.147	29.	2232.207
18.¾	933.125	24.	1528.832	29.¼	2270.853
19.	958.174	24.¼	1560.849	29.½	2309.837
19.¼	983.555	24.½	1593.197	29.¾	2359.152
19.½	1009.268	24.¾	1625.877	30.	2388.800
19.¾	1035.313	25.	1658.889		

WEIGHT OF FLAT ROLLED IRON,

From $\frac{1}{8} \times \frac{1}{2}$ *Inch to* $5\frac{3}{4} \times 6$ *Inches,*

AND ONE FOOT IN LENGTH.

Breadth in inches.	Thickness in inches.	Weight in pounds.	Breadth in inches.	Thickness in inches.	Weight in pounds.	Breadth in inches.	Thickness in inches.	Weight in pounds.
$\frac{1}{2}$	$\frac{1}{8}$	0.211	$1.\frac{3}{8}$	$\frac{1}{8}$	0.580	$1.\frac{3}{4}$	$1.\frac{3}{8}$	8.132
	$\frac{1}{4}$	0.482		$\frac{1}{4}$	1.161		$1.\frac{1}{2}$	8.871
	$\frac{3}{8}$	0.634		$\frac{3}{8}$	1.742		$1.\frac{5}{8}$	9.610
				$\frac{1}{2}$	2.325	$1.\frac{7}{8}$		
$\frac{5}{8}$	$\frac{1}{8}$	0.264		$\frac{5}{8}$	2.904		$\frac{1}{8}$	0.792
	$\frac{1}{4}$	0.528		$\frac{3}{4}$	3.484		$\frac{1}{4}$	1.584
	$\frac{3}{8}$	0.792		$\frac{7}{8}$	4.065		$\frac{3}{8}$	2.376
	$\frac{1}{2}$	1.056	1.		4.646		$\frac{1}{2}$	3.168
$\frac{3}{4}$	$\frac{1}{8}$	0.316	$1.\frac{1}{8}$		5.227		$\frac{5}{8}$	3.960
	$\frac{1}{4}$	0.633	$1.\frac{1}{4}$		5.808		$\frac{3}{4}$	4.752
	$\frac{3}{8}$	0.950					$\frac{7}{8}$	5.544
	$\frac{1}{2}$	1.265	$1.\frac{1}{2}$	$\frac{1}{8}$	0.633	1.		6.336
	$\frac{5}{8}$	1.584		$\frac{1}{4}$	1.266	$1.\frac{1}{8}$		7.129
				$\frac{3}{8}$	1.900	$1.\frac{1}{4}$		7.921
$\frac{7}{8}$	$\frac{1}{8}$	0.369		$\frac{1}{2}$	2.535	$1.\frac{3}{8}$		8.713
	$\frac{1}{4}$	0.738		$\frac{5}{8}$	3.168	$1.\frac{1}{2}$		9.505
	$\frac{3}{8}$	1.108		$\frac{3}{4}$	3.802	$1.\frac{5}{8}$		10.297
	$\frac{1}{2}$	1.477		$\frac{7}{8}$	4.435	$1.\frac{3}{4}$		11.089
	$\frac{5}{8}$	1.846	1.		5.069	2.	$\frac{1}{8}$	0.845
	$\frac{3}{4}$	2.217	$1.\frac{1}{8}$		5.703		$\frac{1}{4}$	1.689
1.	$\frac{1}{8}$	0.422	$1.\frac{1}{4}$		6.337		$\frac{3}{8}$	2.534
	$\frac{1}{4}$	0.845	$1.\frac{3}{8}$		6.970		$\frac{1}{2}$	3.379
	$\frac{3}{8}$	1.267	$1.\frac{5}{8}$				$\frac{5}{8}$	4.224
	$\frac{1}{2}$	1.690		$\frac{1}{8}$	0.686		$\frac{3}{4}$	5.069
	$\frac{5}{8}$	2.112		$\frac{1}{4}$	1.372		$\frac{7}{8}$	5.914
	$\frac{3}{4}$	2.534		$\frac{3}{8}$	2.059	1.		6.758
	$\frac{7}{8}$	2.956		$\frac{1}{2}$	2.746	$1.\frac{1}{8}$		7.604
$1.\frac{1}{8}$	$\frac{1}{8}$	0.475		$\frac{5}{8}$	3.432	$1.\frac{1}{4}$		8.448
	$\frac{1}{4}$	0.950		$\frac{3}{4}$	4.119	$1.\frac{3}{8}$		9.294
	$\frac{3}{8}$	1.425		$\frac{7}{8}$	4.805	$1.\frac{1}{2}$		10.138
	$\frac{1}{2}$	1.901	1.		5.492	$1.\frac{5}{8}$		10.983
	$\frac{5}{8}$	2.375	$1.\frac{1}{8}$		6.178	$1.\frac{3}{4}$		11.828
	$\frac{3}{4}$	2.850	$1.\frac{1}{4}$		6.864	$1.\frac{7}{8}$		12.673
	$\frac{7}{8}$	3.326	$1.\frac{3}{8}$		7.551			
1.		3.802	$1.\frac{1}{2}$		8.237	$2.\frac{1}{8}$	$\frac{1}{8}$	0.898
			$1.\frac{3}{4}$	$\frac{1}{8}$	0,739		$\frac{1}{4}$	1.795
$1.\frac{1}{4}$	$\frac{1}{8}$	0.528		$\frac{1}{4}$	1.479		$\frac{3}{8}$	2.693
	$\frac{1}{4}$	1.056		$\frac{3}{8}$	2.218		$\frac{1}{2}$	3.591
	$\frac{3}{8}$	1.584		$\frac{1}{2}$	2.957		$\frac{5}{8}$	4.488
	$\frac{1}{2}$	2.112		$\frac{5}{8}$	3.696		$\frac{3}{4}$	5.386
	$\frac{5}{8}$	2.640		$\frac{3}{4}$	4.435		$\frac{7}{8}$	6.283
	$\frac{3}{4}$	3.168		$\frac{7}{8}$	5.178	1.		7.181
	$\frac{7}{8}$	3.696	1.		5.914	$1.\frac{1}{8}$		8.079
1.		4.224	$1.\frac{1}{8}$		6.653	$1.\frac{1}{4}$		8.977
$1.\frac{1}{8}$		4.752	$1.\frac{1}{4}$		7.393	$1.\frac{3}{8}$		9.874

Breadth in inches.	Thickness in inches.	Weight in pounds.	Breadth in inches.	Thickness in inches.	Weight in pounds.	Breadth in inches.	Thickness in inches.	Weight in pounds.
2.1/8	1.1/8	10.772	2.1/2	2.	16.896	2.7/8	1.3/8	13.360
	1.1/4	11.670		2.1/8	17.952		1.1/2	14.574
	1.3/8	12.567		2.1/4	19.008		1.5/8	15.789
	1.1/2	13.465		2.3/8	20.064		1.3/4	17.003
	2.	14.362	2.5/8	.1/8	1.109		1.7/8	18.218
2.1/4	.1/8	.950		.1/4	2.218		2.	19.432
	.1/4	1.900		.3/8	3.327		2.1/8	20.647
	.3/8	2.851		.1/2	4.436		2.1/4	21.861
	.1/2	3.802		.5/8	5.545		2.3/8	23.076
	.5/8	4.752		.3/4	6.654		2.1/2	24.290
	.3/4	5.703		.7/8	7.763		2.5/8	25.505
	.7/8	6.653	1.		8.872		2.3/4	26.719
	1.	7.604		1.1/8	9.981	3.	.1/8	1.267
	1.1/8	8.554		1.1/4	11.090		.1/4	2.535
	1.1/4	9.505		1.3/8	12.199		.3/8	3.802
	1.3/8	10.455		1.1/2	13.308		.1/2	5.069
	1.1/2	11.406		1.5/8	14.417		.5/8	6.337
	1.5/8	12.356		1.3/4	15.526		.3/4	7.604
	1.3/4	13.307		1.7/8	16.635		.7/8	8.871
	1.7/8	14.257		2.	17.744		1.	10.138
	2.	15.208		2.1/8	18.853		1.1/8	11.406
	2.1/8	16.158		2.1/4	19.962		1.1/4	12.673
2.3/8	.1/8	1.003		2.3/8	21.071		1.3/8	13.940
	.1/4	2.006		2.1/2	22.180		1.1/2	15.208
	.3/8	3.009	2.3/4	.1/8	1.162		1.5/8	16.475
	.1/2	4.013		.1/4	2.323		1.3/4	17.742
	.5/8	5.016		.3/8	3.485		1.7/8	19.010
	.3/4	6.019		.1/2	4.647		2.	20.277
	.7/8	7.022		.5/8	5.808		2.1/4	22.811
	1.	8.025		.3/4	6.970		2.1/2	25.346
	1.1/8	9.028		.7/8	8.132		2.3/4	27.881
	1.1/4	10.032		1.	9.294	3.1/4	.1/8	1.373
	1.3/8	11.035		1.1/8	10.455		.1/4	2.746
	1.1/2	12.038		1.1/4	11.617		.3/8	4.119
	1.5/8	13.042		1.3/8	12.779		.1/2	5.492
	1.3/4	14.045		1.1/2	13.940		.5/8	6.865
	1.7/8	15.048		1.5/8	15.102		.3/4	8.237
	2.	16.051		1.3/4	16.264		.7/8	9.610
	2.1/8	17.054		1.7/8	17.425	1.		10.983
	2.1/4	18.057	2.		18.587		1.1/8	12.356
2.1/2	.1/8	1.056		2.1/8	19.749		1.1/4	13.730
	.1/4	2.112		2.1/4	20.910		1.3/8	15.102
	.3/8	3.168		2.3/8	22.072		1.1/2	16.475
	.1/2	4.224		2.1/2	23.234		1.5/8	17.848
	.5/8	5.280		2.5/8	24.395		1.3/4	19.221
	.3/4	6.336	2.7/8	.1/8	1.215		1.7/8	20.594
	.7/8	7.392		.1/4	2.429		2.	21.967
	1.	8.448		.3/8	3.644		2.1/4	24.712
	1.1/8	9.504		.1/2	4.858		2.1/2	27.458
	1.1/4	10.560		.5/8	6.072		2.3/4	30.204
	1.3/8	11.616		.3/4	7.287		3.	32.950
	1.1/2	12.672		.7/8	8.502	3.1/2	.1/8	1.479
	1.5/8	13.728	1.		9.716		.1/4	2.957
	1.3/4	14.784		1.1/8	10.931		.3/8	4.436
	1.7/8	15.840		1.1/4	12.145		.1/2	5.914

Breadth in inches.	Thickness in inches.	Weight in pounds.	Breadth in inches.	Thickness in inches.	Weight in pounds.	Breadth in inches.	Thickness in inches.	Weight in pounds.
3. 1/2	.5/8	7.393	4. 1/4	.1/8	1.795	5.	1.	16.897
	.3/4	8.871		.1/4	3.591		1. 1/4	21.122
	.7/8	10.350		.1/2	7.181		1. 1/2	25.346
	1.	11.828		.3/4	10.772		1. 3/4	29.570
	1. 1/8	13.307		1.	14.364		2.	33.795
	1. 1/4	14.785		1. 1/4	17.953		2. 1/4	38.019
	1. 3/8	16.264		1. 1/2	21.544		2. 1/2	42.243
	1. 1/2	17.742		1. 3/4	25.135		2. 3/4	46.468
	1. 5/8	19.221		2.	28.725		3.	50.692
	1. 3/4	20.699		2. 1/4	32.316		3. 1/4	54.916
	1. 7/8	22.178		2. 1/2	35.907		3. 1/2	59.140
	2.	23.656		2. 3/4	39.497		3. 3/4	63.365
	2. 1/4	26.613		3.	43.088		4.	67.589
	2. 1/2	29.570		3. 1/4	46.679		4. 1/4	71.813
	2. 3/4	32.527		3. 1/2	50.269		4. 1/2	76.038
	3.	35.485		3. 3/4	53.860		4. 3/4	80.262
	3. 1/4	38.441		4.	57.450	5. 1/4	.1/4	4.436
3. 3/4	.1/8	1.584	4. 1/2	.1/4	3.802		.1/2	8.871
	.1/4	3.168		.1/2	7.604		.3/4	13.307
	.3/8	4.752		.3/4	11.406		1.	17.742
	.1/2	6.336		1.	15.208		1. 1/4	22.178
	.5/8	7.921		1. 1/4	19.010		1. 1/2	26.613
	.3/4	9.505		1. 1/2	22.812		1. 3/4	31.049
	.7/8	11.089		1. 3/4	26.614		2.	35.484
	1.	12.673		2.	30.415		2. 1/4	39.920
	1. 1/8	14.257		2. 1/4	34.217		2. 1/2	44.355
	1. 1/4	15.841		2. 1/2	38.019		2. 3/4	48.791
	1. 3/8	17.425		2. 3/4	41.820		3.	53.226
	1. 1/2	19.009		3.	45.623		3. 1/4	57.662
	1. 5/8	20.594		3. 1/4	49.425		3. 1/2	62.097
	1. 3/4	22.178		3. 1/2	53.226		3. 3/4	66.533
	1. 7/8	23.762		3. 3/4	57.028		4.	70.968
	2.	25.346		4.	60.830		4. 1/4	75.404
	2. 1/4	28.514		4. 1/4	64.632		4. 1/2	79.839
	2. 1/2	31.682	4. 3/4	.1/4	4.013		4. 3/4	84.275
	2. 3/4	34.851		.1/2	8.026		5.	88.710
	3.	38.019		.3/4	12.039	5. 1/2	.1/4	4.647
	3. 1/4	41.187		1.	16.052		.1/2	9.294
	3. 1/2	44.355		1. 1/4	20.066		.3/4	13.940
4.	.1/8	1.690		1. 1/2	24.079		1.	18.587
	.1/4	3.380		1. 3/4	28.092		1. 1/4	23.234
	.3/8	6.759		2.	32.105		1. 1/2	27.881
	.1/2	10.138		2. 1/4	36.118		1. 3/4	32.527
	1.	13.518		2. 1/2	40.131		2.	37.174
	1. 1/4	16.897		2. 3/4	44.144		2. 1/4	41.821
	1. 1/2	20.277		3.	48.157		2. 1/2	46.468
	1. 3/4	23.656		3. 1/4	52.170		2. 3/4	51.114
	2.	27.036		3. 1/2	56.184		3.	55.761
	2. 1/4	30.415		3. 3/4	60.197		3. 1/4	60.408
	2. 1/2	33.795		4.	64.210		3. 1/2	65.055
	2. 3/4	37.174		4. 1/4	68.223		3. 3/4	69.701
	3.	40.554		4. 1/2	72.235		4.	74.348
	3. 1/4	43.933	5.	.1/4	4.224		4. 1/4	78.995
	3. 1/2	47.313		.1/2	8.449		4. 1/2	83.642
	3. 3/4	50.692		.3/4	12.673		4. 3/4	88.288

Breadth in inches.	Thickness in inches.	Weight in pounds.	Breadth in inches.	Thickness in inches.	Weight in pounds.	Breadth in inches.	Thickness in inches.	Weight in pounds.
5.½	5.	92.935	5.¾	1.¾	34.006	5.¾	3.¾	72.870
	5.¼	97.582		2.	38.864		4.	77.728
5.¼	.¼	4.858		2.¼	43.722		4.¼	82.585
	.½	9.716		2.½	48.580		4.½	87.443
	.¾	14.574		2.¾	53.437		4.¾	92.301
	1.	19.432		3.	58.296		5.	97.159
	1.¼	24.290		3.¼	63.154		5.¼	102.017
	1.½	29.148		3.½	68.012		5.½	106.876
							6.	116.592

APPLICATION OF THE PRECEDING TABLES.

The dimensions of a bolt or bar of iron being given, find its weight in the appropriate column, which is for the length of one foot; multiply this weight by the number of feet and parts thereof in the bolt or bar, and the product is the weight.

EXAMPLE 1.—What is the weight of a BAR OF SQUARE IRON 1½ inches square and 6½ feet in length?

Opposite to 1½ inches in size, in table at page 48, is 7.604 lbs., which is the weight of such a bar for a length of one foot.

Hence 7.604 lbs.,
multiplied by 6½ feet,

45624
3802

is equal to 49.426 pounds.

If the lesser denomination of ounces is required, the result is obtained as follows: Multiply the remainder by 16, pointing off the decimals as in multiplication of decimals, and the figures remaining on the left of the point indicate the number of ounces.

Thus, .426 of a lb. = .426
16

2556
426

6.816 ounces.

The weight, then, is 49 lbs. 6 ounces and $\frac{816}{1000}$.

If the weight for less than a foot in length was required, the readiest operation is this:

EXAMPLE 2.—What is the weight of a bar or bolt 6¼ inches square and 9¾ inches long?

On page 48, column 5th, opposite to 6¼, is 132.040, which is the weight for a foot in length.

$6\frac{1}{4} \times 12$ inches		$=132.040$
6. "	is $\frac{1}{2}$	$= 66.020$
3. "	is $\frac{1}{2}$ of 6	$= 33.010$
$.\frac{1}{2}$ "	is $\frac{1}{6}$ of 3	$= 5.5016$
$.\frac{1}{4}$ "	is $\frac{1}{2}$ of $\frac{1}{2}$	$= 2.7508$
$9.\frac{1}{4}$		$=107.2824$, or 107 pounds and $\frac{2824}{10000}$.

EXAMPLE 3.—What is the weight of a BOLT OR ROD OF IRON 2 inches in diameter and $9\frac{3}{4}$ feet in length?

Opposite to 2 inches in column 1st, page 49, is 10.617, which is the weight of such a rod for the length of one foot.

Hence

10.617 lbs.
$9\frac{3}{4}$ feet
95.553
5.308
2.654
103.515 pounds.

EXAMPLE 4.—What is the weight of a BAR OF FLAT IRON $\frac{3}{4}$ of an inch in thickness by $5\frac{1}{4}$ inches in breadth, and 7 feet $6\frac{1}{2}$ inches in length?

Opposite to $5\frac{1}{4}$, and to $\frac{3}{4}$ in thickness, in column 9th, page 53, is 13.307 lbs., which is the weight of such a bar for a length of one foot.

Hence

13.307
7 feet
93.149 pounds.

Then, to determine the weight for $6\frac{1}{2}$ inches, proceed as shown above, in example 2, or in the following manner:

Divide the weight for one foot by 12 (12 inches), and the result is the weight for one inch in length.

Thus $\frac{13.307}{12} = 1.109$.

Then multiplied by

1.109
$6\frac{1}{2}$
6.654
554
is equal to 7.208 pounds,

which, added to the 93.149 before obtained, is equal to 100.357 pounds.

CAST IRON.

To ascertain the weight of a cast iron BOLT or BAR, find the weight of a wrought iron bolt or bar of the same dimensions in the preceding tables, and from the weight deduct the $\frac{2}{71}$th part;

Or, as 486.65 : 450.55 :: the weight in the table : to the weight required.

EXAMPLE.—What is the weight of a piece of cast iron $4 \times 3\frac{1}{4} \times 12$ inches?

In table, page 53, the weight of a piece of wrought iron of these dimensions is 50.692 lbs.

Then 486.65 : 450.55 :: 50.692 : 46.93 lbs.

To find the weight of a piece of CAST *or* WROUGHT IRON *of any size or shape.*

Find the number of cubic inches in the piece, multiply them by the weight of a cubic inch, and the product will be the weight in pounds.

EXAMPLE 1.—What is the weight of a block of WROUGHT IRON 10 inches square by 15 inches in length?

$10 \times 10 \times 15 = 1500$ cubic inches.

.2816 weight of a cubic inch of wrought iron.

442.4000 pounds.

EXAMPLE 2.—What is the weight of a CAST IRON ball 15 inches in diameter?

By table, page 62, a cast iron ball 15 inches in diameter = 176.7149 cubic inches.

.2607 weight of a cubic inch of cast iron.

460.6957 pounds.

LEAD.

To ascertain the weight of Lead.

RULE.—Find the number of cubic inches in the piece, multiply them by .41015, and the product will be the weight in pounds.

EXAMPLE.—What is the weight of a leaden pipe 12 feet long, $3\frac{1}{4}$ inches in diameter, and 1 inch thick?

Area of $(3\frac{1}{4}+1+1) = 25.967$

" " $3\frac{1}{4} = 11.044$

Difference, 14.923, or area of ring.

144 = 12 feet.

$2148.912 \times .41015 = 881.376$ pounds.

WEIGHT OF COPPER BOLTS OR RODS,

From ¼ to 4 inches in diameter.

ONE FOOT IN LENGTH.

Diameter.	Pounds.	Diameter.	Pounds.	Diameter.	Pounds.
.¼	.1892	1.⅛	3.8312	2.⅜	17.0750
.5/16	.2956	1.3/16	4.2688	2.½	18.9161
.⅜	.4256	1.¼	4.7298	2.⅝	20.8562
.7/16	.5794	1.5/16	5.2140	2.¾	22.8913
.½	.7567	1.⅜	5.7298	2.7/8	25.0188
.9/16	.9578	1.7/16	6.2547	3.	27.2435
.⅝	1.1824	1.½	6.8109	3.⅛	29.5594
.11/16	1.4307	1.9/16	7.3898	3.¼	31.9722
.¾	1.7027	1.⅝	7.9931	3.⅜	34.4815
.13/16	1.9982	1.¾	9.2702	3.½	37.0808
.⅞	2.3176	1.7/8	10.6420	3.⅝	39.7774
.15/16	2.6605	2.	12.1082	3.¾	42.5680
1.	3.0270	2.⅛	13.6677	3.7/8	45.4550
1.1/16	3.4170	2.¼	15.3251	4.	48.4330

To find the weight of a bolt or rod of a greater or less length than one foot, proceed as by the rules given in pages 54 and 55, to find the weights of wrought iron bolts or bars.

COPPER.

To ascertain the weight of copper.

RULE.—Find the number of cubic inches in the piece, multiply by .32118, and the product will be the weight in pounds.

EXAMPLE.—What is the weight of a copper plate ½ an inch thick by 16 inches square?

$16 \times 16 = 256$

.5 for ½ an inch.

$128.0 \times .32118 = 41.111$ pounds.

BRAZIER'S SHEETS are 30×60 inches, and from 12 to 100 lbs. per square foot.

SHEATHING COPPER is 14×48 inches, and from 14 to 34 oz. per square foot.

WEIGHT OF A SQUARE FOOT OF CAST AND WROUGHT IRON, COPPER, AND LEAD,

From $\frac{1}{16}$th to 2 inches thick.

Thickness.	Cast Iron.	Wrought Iron. *Hard rolled.*	Copper. *Hard rolled.*	Lead.
	Pounds.	Pounds.	Pounds.	Pounds.
$\cdot\frac{1}{16}$	2.346	2.517	2.890	3.691
$\cdot\frac{1}{8}$	4.693	5.035	5.781	7.382
$\cdot\frac{3}{16}$	7.039	7.552	8.672	11.074
$\cdot\frac{1}{4}$	9.386	10.070	11.562	14.765
$\cdot\frac{5}{16}$	11.733	12.588	14.453	18.456
$\cdot\frac{3}{8}$	14.079	15.106	17.344	22.148
$\cdot\frac{7}{16}$	16.426	17.623	20.234	25.839
$\cdot\frac{1}{2}$	18.773	20.141	23.125	29.530
$\cdot\frac{9}{16}$	21.119	22.659	26.016	33.222
$\cdot\frac{5}{8}$	23.466	25.176	28.906	36.913
$\cdot\frac{11}{16}$	25.812	27.694	31.797	40.604
$\cdot\frac{3}{4}$	28.159	30.211	34.688	44.296
$\cdot\frac{13}{16}$	30.505	32.729	37.578	47.987
$\cdot\frac{7}{8}$	32.852	35.247	40.469	51.678
$\cdot\frac{15}{16}$	35.199	37.764	43.359	55.370
1.	37.545	40.282	46.250	59.061
$1.\frac{1}{8}$	42.238	45.317	52.031	66.444
$1.\frac{1}{4}$	46.931	50.352	57.813	73.826
$1.\frac{3}{8}$	51.625	55.387	63.594	81.210
$1.\frac{1}{2}$	56.317	60.422	69.375	88.592
$1.\frac{5}{8}$	61.011	65.458	75.156	95.975
$1.\frac{3}{4}$	65.704	70.493	80.938	103.358
$1.\frac{7}{8}$	70.397	75.528	86.719	110.740
2.	75.090	80.563	92.500	118.128

WEIGHT OF RIVETED COPPER PIPES,

From 5 to 31 inches in diameter, and from $\frac{3}{16}$ths to $\frac{5}{16}$ths thick.

ONE FOOT IN LENGTH.

Diameter in inches.	Thickness in 16ths.	Weight in pounds.	Diameter in inches.	Thickness in 16ths.	Weight in pounds.
5.	3	12.497	15.	5	59.588
5.	4	16.880	16.	4	50.752
5.$\frac{1}{2}$	3	13.628	16.	5	63.470
5.$\frac{1}{2}$	4	18.395	17.	4	53.856
6.	3	14.765	17.	5	67.344
6.	4	19.908	18.	4	57.037
6.$\frac{1}{2}$	3	15.897	18.	5	71.258
6.$\frac{1}{2}$	4	21.415	19.	4	60.142
7.	3	17.034	19.	5	75.233
7.	4	22.932	20.	5	78.208
7.$\frac{1}{2}$	4	24.447	21.	5	82.984
8.	4	25.961	22.	5	86.771
8.$\frac{1}{2}$	4	27.471	23.	5	90.571
9.	4	28.985	24.	5	94.308
9.$\frac{1}{2}$	4	30.598	25.	5	98.122
10.	4	32.208	26.	5	101.897
11.	4	35.200	27.	5	105.700
12.	4	38.456	28.	5	109.446
13.	4	41.456	29.	5	113.221
14.	4	44.640	30.	5	116.997
15.	4	47.646	31.	5	120.772

The above weights include the laps on the sheets for riveting and calking.

The weights of the rivets are not added; the *number* per lineal foot of pipe depends upon their diameter, and their *size* upon the thickness of the metal of the pipe.

BRASS.

To ascertain the weight of brass castings.

RULE.—Find the number of cubic inches in the piece, multiply them by .3112, and the product will be the weight in pounds.

WEIGHT OF CAST IRON PIPES,

OF DIFFERENT THICKNESS,

From 1 *inch to* 36 *inches bore.*

ONE FOOT IN LENGTH.

Bore.	Th'kness.	Weight.	Bore.	Th'kness.	Weight.	Bore.	Th'kness.	Weight.
inches.	inches.	pounds.	inches.	inches.	pounds.	inches.	inches.	pounds.
1.	1/8	3.06	4. 3/4	1/2	25.70	9.	1.	97.98
	3/8	5.05		5/8	32.91	9. 1/2	1/2	48.98
1. 1/4	1/4	3.67		3/4	40.43		5/8	62.02
	3/8	6.	5.	1/2	26.94		3/4	75.32
1. 1/2	3/8	6.89		5/8	34.34		7/8	88.98
	1/2	9.80		3/4	42.28	1.		102.90
1. 3/4	3/8	7.80	5. 1/2	1/2	29.40	10.	1/2	51.46
	1/2	11.04		5/8	37.44		5/8	65.08
2.	3/8	8.74		3/4	45.94		3/4	78.99
	1/2	12.23	6.	1/2	31.82		7/8	93.24
2. 1/4	3/8	9.65		5/8	40.56	1.		108.84
	1/2	13.48		3/4	49.60	10. 1/2	1/2	53.88
2. 1/2	3/8	10.57	6. 1/2	1/2	58.96		5/8	68.14
	1/2	14.66		5/8	34.32		3/4	82.68
	5/8	19.05		3/4	43.68		7/8	97.44
2. 3/4	3/8	11.54		7/8	53.30	1.		112.68
	1/2	15.91	7.	1/2	63.18	11.	1/2	56.34
	5/8	20.59		5/8	36.66		5/8	71.19
3.	3/8	12.28		3/4	46.80		3/4	86.40
	1/2	17.15		7/8	56.96		7/8	101.83
	5/8	22.15	1.		67.60	1.		117.60
	3/4	27.56	7. 1/2	1/2	78.39	11. 1/2	1/2	58.82
3. 1/4	1/2	18.40		5/8	39.22		5/8	74.28
	5/8	23.72		3/4	49.92		3/4	90.06
	3/4	29.64		7/8	60.48		7/8	106.14
3. 1/2	1/2	19.66	1.		71.76	1.		122.62
	5/8	25.27	8.	1/2	83.28	12.	1/2	61.26
	3/4	31.20		5/8	41.64		5/8	77.36
3. 3/4	1/2	20.90		3/4	52.68		3/4	93.70
	5/8	26.83		7/8	64.27		7/8	110.48
	3/4	33.07	1.		76.12	1.		127.42
4.	1/2	22.05	8. 1/2	1/2	88.20	12. 1/2	1/2	63.70
	5/8	28.28		5/8	44.11		5/8	80.40
	3/4	34.94		3/4	56.16		3/4	97.40
4. 1/4	1/2	23.35		7/8	68.		7/8	114.72
	5/8	29.85	1.		80.50	1.		132.35
	3/4	36.73	9.	1/2	93.28	13.	1/2	66.14
4. 1/2	1/2	24.49		5/8	46.50		5/8	83.46
	5/8	31.40		3/4	58.92		3/4	101.08
	3/4	38.58		7/8	71.70		7/8	118.97
					84.70		1.	137.28

Bore.	Th'kness.	Weight.	Bore.	Th'kness.	Weight.	Bore.	Th'kness.	Weight.
inches.	inches.	pounds.	inches.	inches.	pounds.	inches.	inches.	pounds.
13.½	.½	68.64	17.½	.½	88.23	27.	.¾	204.04
	.⅝	86.55		.⅝	111.06		.⅞	239.08
	.¾	104.76		.¾	134.16		1.	274.56
	.⅞	123.30		.⅞	157.59	28.	.¾	211.32
	1.	142.16		1.	181.33		.⅞	247.62
14.	.½	71.07	18.	.⅝	114.10		1.	284.28
	.⅝	89.61		.¾	137.84	29.	.¾	218.70
	.¾	108.46		.⅞	161.90		.⅞	256.20
	.⅞	127.60		1.	186.24		1.	294.02
	1.	147.03	19.	.⅝	120.24	30.	.¾	226.20
14.½	.½	73.72		.¾	145.20		.⅞	264.79
	.⅝	92.66		.⅞	170.47		1.	303.86
	.¾	112.10		1.	195.92		1.⅛	343.20
	.⅞	131.86	20.	.⅝	126.33	31.	.¾	233.40
	1.	151.92		.¾	152.53		.⅞	273.40
15.	.½	75.96		.⅞	179.02		1.	313.68
	.⅝	95.72		1.	205.80		1.⅛	354.24
	.¾	115.78	21.	.⅝	132.50	32.	.¾	240.76
	.⅞	136.15		.¾	159.84		.⅞	281.94
	1.	156.82		.⅞	187.60		1.	323.49
15.½	.½	78.40		1.	215.52		1.⅛	365.29
	.⅝	98.78	22.	.⅝	138.60	33.	.¾	248.10
	.¾	119.48		.¾	167.24		.⅞	290.50
	.⅞	140.40		.⅞	196.46		1.	333.24
	1.	161.82		1.	225.38		1.⅛	376.26
16.	.½	80.87	23.	.⅝	144.77	34.	.¾	255.45
	.⅝	101.82		.¾	174.62		.⅞	298.88
	.¾	123.14		.⅞	204.78		1.	342.88
	.⅞	144.76		1.	235.28		1.⅛	387.13
	1.	166.60	24.	.⅝	150.85		1.¼	431.76
16.½	.½	83.30		.¾	181.92	35.	.¾	262.70
	.⅝	104.82		.⅞	213.28		.⅞	307.62
	.¾	126.79		1.	245.08		1.	352.86
	.⅞	149.02	25.	.⅝	156.97		1.⅛	398.10
	1.	171.60		.¾	189.28		1.¼	443.96
17.	.½	85.73		.⅞	221.94	36.	.¾	270.18
	.⅝	107.96		1.	254.86		.⅞	316.36
	.¾	130.48	26.	.¾	196.62		1.	362.86
	.⅞	153.30		.⅞	230.56		1.⅛	409.34
	1.	176.58		1.	264.66		1.¼	456.46

WEIGHT AND CAPACITY OF CAST IRON AND LEAD BALLS,

From 1 *to* 20 *inches in diameter.*

Diameter in inches.	Capacity in cubic inches.	CAST IRON. Weight in pounds.	LEAD. Weight in pounds.
1.	.5236	.1365	.2147
1.¼	1.0227	.2666	.4195
1.½	1.7672	.4607	.7248
1.¾	2.8062	.7316	1.1510
2.	4.1888	1.0920	1.7180
2.¼	5.9641	1.5548	2.4462
2.½	8.1812	2.1328	3.3555
2.¾	10.8892	2.8388	4.4662
3.	14.1372	3.6856	5.7984
3.¼	17.9742	4.6859	7.3721
3.½	22.4493	5.8525	9.2076
3.¾	27.6117	7.1984	11.3249
4.	33.5104	8.7362	13.7443
4.¼	40.1945	10.4787	16.4858
4.½	47.7130	12.4388	19.5695
4.¾	56.1152	14.6292	23.0156
5.	65.4500	17.0628	26.8443
5.¼	75.7675	19.7523	31.0756
5.½	87.1139	22.7106	35.7298
5.¾	99.5413	25.9504	40.8269
6.	113.0976	29.4845	46.3870
6.¼	127.7020	33.2919	52.3770
6.½	143.7937	37.4870	58.9768
6.¾	161.0315	41.9809	66.0471
7.	179.5948	46.8204	73.6608
7.¼	199.5325	52.0188	81.8382
7.½	220.8937	57.5870	90.5995
7.¾	243.7276	63.5397	99.9649
8.	268.0832	69.8893	109.9543
8.¼	294.0096	76.6483	120.5880
8.½	321.5558	83.8296	131.8861
8.¾	350.7711	91.4460	143.8688
9.	381.7044	99.5103	156.5560
9.½	448.9215	117.0338	184.1251
10.	523.6000	136.5025	214.7545
11.	696.9116	181.6849	285.8383
12.	904.7808	235.8764	371.0959
13.	1150.349	299.8960	471.8158
14.	1436.7584	374.5629	589.2865
15.	1767.1500	460.6960	724.7966
16.	2144.6657	559.1143	879.6346
17.	2572.4468	670.6368	1055.0891
18.	3053.6352	796.0827	1252.4486
19.	3591.3724	936.2708	1473.0014
20.	4188.8000	1092.0202	1718.0363

NOTE.—If the weight in Wrought Iron or Copper is required, multiply the capacity of the ball by .2816 for the former, and .32118 for the latter.

WEIGHT OF LEAD PIPE PER YARD,

From ⅜ to 5 inches diameter.

WATER PIPES FOR HYDRANTS, PUMPS, ETC.

Diameter of bore in inches.	Thickness in 1-100ths of an inch.	Weight per foot in pounds.	Diameter of bore in inches.	Thickness in 1-100ths of an inch.	Weight per foot in pounds.
.⅜	6	.424	1.½	14	3.5
	8	.625		17	4.25
	12	1.		19	5.
	16	1.25		23	6.5
	19	1.5		27	8.
.½	7	.545	1.¾	13	4.
	9	.75		17	5.
	11	1.		21	6.5
	13	1.25		27	8.5
	16	1.75	2.	15	4.75
	19	2.		18	6.
.⅝	8	.727		22	7.
	9	1.		27	9.
	13	1.5	2.½	⅜ of an in.	8.
	16	2.		½ "	11.
	20	2.5		⅝ "	14.
	22	3.		¾ "	17.
.¾	8	.969	3.	⅜ "	9.
	10	1.25		½ "	12.
	12	1.75		⅝ "	16.
	16	2.25		¾ "	20.
	20	3.	3.½	⅜ "	12.5
	23	3.5		½ "	15.
1.	10	1.5		⅝ "	18.5
	11	2.		¾ "	22.
	14	2.5	4.	⅜ "	12.
	17	3.25		½ "	16.
	21	4.		⅝ "	21.
	24	4.75		¾ "	25.
1.¼	10	2.	4.½	⅜ "	14.
	12	2.5		¼ "	18.
	14	3.	5.	½ "	20.
	16	3.75		¾ "	31.
	19	4.75			
	25	6.			

WASTE PIPE.

1½ inch diam. 2 lbs. per foot.
2 " 3 lbs. "
3 " 3½ and 5 lbs. per foot.
4 in. diam. 5, 6, and 8 lbs. per ft.
4½ " 6 and 8 lbs. "
5 " 8, 10, and 12 lbs. per foot.

WEIGHT OF A SQUARE FOOT OF WROUGHT IRON,

AS PER BIRMINGHAM WIRE GUAGE.

No. of Guage.	Lbs.	No. of Guage.	Lbs.	No. of Guage.	Lbs.	No. of Guage.	Lbs.
1	12.55	8	6.64	15	2.97	21	1.32
2	11.25	9	6.29	16	2.62	22	1.15
3	10.45	10	5.5	17	2.19	23	.99
4	9.55	11	4.73	18	1.92	24	.95
5	8.66	12	4.3	19	1.7	25	.84
6	8.34	13	3.64	20	1.41	26	.78
7	7.5	14	3.23				

VALUES OF THE BIRMINGHAM GUAGES,

For Iron Wire and for Sheet Iron and Steel.

No.	Inches.	No.	Inches.	No.	Inches.	No.	Inches.
0	.340	10	.134	19	.042	28	.014
1	.300	11	.120	20	.035	29	.013
2	.284	12	.109	21	.032	30	.012
3	.259	13	.095	22	.028	31	.010
4	.238	14	.083	23	.025	32	.009
5	.220	15	.072	24	.022	33	.008
6	.203	16	.065	25	.020	34	.007
7	.180	17	.058	26	.018	35	.005
8	.165	18	.049	27	.016	36	.004
9	.148						

For Sheet Brass, Silver, Gold, &c.

1	.004	10	.024	19	.064	28	.120
2	.005	11	.029	20	.067	29	.124
3	.008	12	.034	21	.072	30	.126
4	.010	13	.036	22	.074	31	.133
5	.012	14	.041	23	.077	32	.143
6	.013	15	.047	24	.082	33	.145
7	.015	16	.051	25	.095	34	.148
8	.016	17	.057	26	.103	35	.158
9	.019	18	.061	27	.113	36	.167

LAP-WELDED IRON BOILER TUBES (*Prosser's Patent*).

TABLE *of the Diameter, Thickness, and Weight of Iron Boiler Tubes.*

External Diameter.	Thickness of Wire Guage.	Average Weight.	Price per foot.	External Diameter.	Thickness of Wire Guage.	Average Weight.	Price per foot.
Inches.	No.	lbs. per ft.	Cents.	Inches.	No.	lbs. per ft.	$ c.
$1\frac{1}{4}$	16	1	20	$2\frac{3}{4}$	$12\frac{1}{2}$	$2\frac{5}{6}$	48
$1\frac{1}{2}$	15	$1\frac{1}{6}$	29	3	"	$3\frac{1}{10}$	51
$1\frac{3}{4}$	13	$1\frac{5}{8}$	31	$3\frac{1}{2}$	12	4	85
2	"	2	34	4	11	5	1 10
2	"	2	"	5	10	$6\frac{1}{2}$	1 50
$2\frac{1}{4}$	"	$2\frac{1}{6}$	39	6	"	9	2 20
$2\frac{1}{2}$	$12\frac{1}{2}$	$2\frac{9}{16}$	43	7	8	12	3 00
$2\frac{11}{16}$	14	$2\frac{1}{3}$	46	8	7	16	4 00

SCREWS.

TABLE *showing the Number of Threads to an Inch in V thread Screws.*

Diam. in inches,	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$
No. of threads,	20	18	16	14	12	11	10	9	8	7	7	6
Diam. in inches,	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	
No. of threads,	6	5	5	$4\frac{1}{2}$	$4\frac{1}{2}$	4	4	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{4}$	
Diam. in inches,	$3\frac{3}{4}$	4	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$	5	$5\frac{1}{4}$	$5\frac{1}{2}$	$5\frac{3}{4}$	6		
No. of threads,	3	3	$2\frac{7}{8}$	$2\frac{7}{8}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{5}{8}$	$2\frac{5}{8}$	$2\frac{1}{2}$	$2\frac{1}{2}$		

The depth of the threads should be half their pitch.

The diameter of a screw, to work in the teeth of a wheel, should be such that the angle of the threads does not exceed 10°.

TIN.

Description.	Size of sheet.	Mean thickness.		Mean weight of one sheet.
		No on wire guage.	Thickness of sheet.	
	inches.		inches.	lbs.
Single ...	10×14	31	.0125 (or 80 to 1 inch)	0.5
Double X	10×14	27	.0181 (or 55 to 1 inch)	0.75

There are usually 225 sheets in a box.

ALLOYS OF COPPER AND TIN.

GUN METAL.

Tin to be added to 1 *pound of Copper.*

Soft gun metal	1 oz.
Mathematical instruments	1.25 "
Wheels	1.5 "
Guns, large	1.75 "
" small	1.50 "
Machinery bearings	2 to 2.50 "
Musical bells	3 "
Gongs, cymbals, &c.	3.50 "
House bells, small	4 "
" " large	4.50 "
Church bells	5 "
Speculum metal	7 to 8 "

Temper metal for adding small quantities of copper, 32 oz.

COPPER AND ZINC.

Tin to be added to 1 *pound.*

Copper castings	1.125 to 1.50 oz.
Gilding metal	1 " 1.50 "
Tombac (red brass)	2 "
Red sheet brass. Pinchbeck and Bath metal	3 to 4 "
Bristol brass	6 "
Ordinary brass	8 "
Muntz's metal for ship fastenings, sheathing, &c.	10.66 "
Soft spelter solder	16 "

COPPER, ZINC, TIN, AND LEAD.

	Tin.	Zinc.	Copper.	Brass.
Extremely tenacious	1.5 oz.	.5 oz.	16 oz.	
Wheels	1.5 "		16 "	2 oz.
For turning	2 "			1.5 "
Bearings, Nuts, &c.	2.5 "			1.5 "

SOLDERS.

For *Lead*, melt 1 part of Block Tin, and when in a state of fusion, add 2 parts of Lead. Resin should be used with this solder.

For *Tin*, Pewter 4 parts, Tin 1, and Bismuth 1; melt them together. Resin is also used with this solder.

For *Iron*, tough Brass, with a small quantity of Borax.

CEMENTS.

Glue. Powdered chalk added to common glue strengthens it.

A glue which will resist the action of water is made by boiling 1 pound of glue in 2 quarts of skimmed milk.

Soft Cement. For steam-boilers, steam-pipes, &c. Red or white lead in oil, 4 parts; iron borings, 2 to 3 parts.

Hard Cement. Iron borings and salt water, and a small quantity of sal ammoniac with fresh water.

Cement, Ashes, 2 parts
Clay, 3 "
Sand, 1 "
} mixed with oil, will resist the weather equal to marble.

HYDRAULIC CEMENT.

A barrel contains 300 lbs., equal to four struck bushels.

BROWN MORTAR.

One third Thomaston lime,
Two thirds sand, and a small quantity of hair.

Lime and sand, and cement and sand, lessen about $\frac{1}{3}$ in bulk when made into mortar.

DIGGING.

23 cubic feet of sand, or 18 cubic feet of earth, or 17 cubic feet of clay, make a ton.

18 cubic feet of gravel or earth before digging, make 27 cubic feet when dug.

GAS PIPES.

TABLE *of the Diameter and Length of Gas Pipes to transmit given Quantities of Gas to branch Pipes and Burners.*—Dr. URE.

No. of cubic feet of gas per hour.	Length of pipe in feet.	Diameter of pipe in inches.
50	100	0.40
250	200	1.
500	600	1.97
700	1000	2.65
1000	1000	3.16
1500	1000	3.87
2000	1000	4.47
2000	2000	5.32
2000	4000	6.33
2000	6000	7.
6000	1000	7.75
6000	2000	9.21
8000	1000	8.95
8000	2000	16.65

These dimensions are applicable to the mains which conduct the gas to the places where it is to be used. If they send off branches for burners, the diameter may be reduced, or the length may be greater.

For example, if a pipe of 5.32 inches, which transmits 2000 cubic feet through a length of 2000 feet, gives off, in this space, 1000 cubic feet of gas, then the same diameter can continue to transmit the gas through a length of 2450 feet.

CISTERNS.

CAPACITY OF CISTERNS IN U. S. GALLONS,

For each 10 *inches in depth.*

2	feet diameter.....	19.5	8	feet diameter.....	313.33
2½	"	30.6	8½	"	353.72
3	"	44.06	9	"	396.56
3½	"	59.97	9½	"	461.40
4	"	78.33	10	"	489.20
4½	"	99.14	11	"	592.40
5	"	122.40	12	"	705.
5½	"	148.10	13	"	827.4
6	"	176.25	14	"	959.6
6½	"	206.85	15	"	1101.6
7	"	239.88	20	"	1958.4
7½	"	275.40	25	"	3059.9

WEIGHTS OF VARIOUS SUBSTANCES.

	Cubic foot in pounds.	Cubic inch in pounds.
Platinum	1378.94	.798
Gold	1204.41	.697
Mercury	850.18	.492
Lead	708.75	.41015
Silver	654.91	.379
Copper	555.	.32118
Brass	537.75	.3112
Steel	489.8	.2834
Wrought Iron	486.65	.2816
Tin	456.	.263
Cast Iron	450.55	.2607
Zinc	428.54	.248
Granite	164.16	.095
Clay	135.	.0756
Strong soil	127.	.0735
Brick	125.	.0723
Common soil	124.	.0717
Coal (anthracite)	95.04	.055
" (bituminous)	81.22	.047
Loose earth or sand	95.	.0549
Live Oak	70.	.040
Hickory	51.84	.030
White Oak	45.2	.026
Mahogany	44.93	.026
Salt Water (sea)	64.3	.03721
Fresh Water	62.5	.03616
Yellow Pine	33.81	.019
White Pine	29.56	.0171
Tallow	59.	.03414
Cork	15.	.00868
Air	.07529	—
Steam	.03689	—

WEIGHT OF COMPOSITION SHEATHING NAILS.

Number.	Length in inches.	Number in a pound.	Number.	Length in inches.	Number in a pound.
1	$\frac{3}{4}$	290	8	$1\frac{1}{4}$	168
2	$\frac{7}{8}$	260	9	$1\frac{1}{2}$	110
3	1	212	10	$1\frac{5}{8}$	101
4	$1\frac{1}{8}$	201	11	$1\frac{3}{4}$	74
5	$1\frac{1}{4}$	199	12	2	64
6	1	190	13	$2\frac{1}{4}$	59
7	$1\frac{1}{8}$	184			

SLATING.

Sizes of Slates.

Doubles	14	by 6	inches.
Ladies'	15	" 8	"
Countess	22	" 11	"
Duchess	26	" 15	"
Imperial and Patent	32	" 26	"
Rags and Queens	39	" 27	"

HEMPEN CORDS.

Hempen Cords, when twisted, will support the following weights to the *square inch* of their section.

	Lbs.		Lbs.
¼ to 1 inch diameter	8.746	3 to 5 inches diameter	5.345
1 to 3 inches diameter	6.800	5 to 7 inches diameter	4.860

STRENGTH AND STIFFNESS OF METALS,

Cast Iron being 1.

	Strength.	Stiffness.
Wrought Iron	1.12	1.3
Brass	.435	.49
Zinc	.365	.76
Tin	.182	.25
Lead	.046	.0385

PAINTS AND LACKERS.

White Paint.

	Inside work.	Outside work.
White-lead, ground in oil	80.	80
Boiled oil	14.5	9
Raw oil	—	9
Spirits turpentine	8.	4

New wood work requires about 1 lb. to the square yard for 3 coats.

Lead Color.

White-lead, ground in oil.	75	Litharge	.5
Lampblack	1	Japan varnish	.5
Boiled linseed oil	23	Spirits turpentine	2.5

The turpentine and varnish are added as the paint is required for use or transportation.

Gray or Stone Color.

White-lead, in oil	78.	Spirits turpentine	3.
Boiled oil	9.5	Turkey umber	.5
Raw oil	9.5	Lampblack	.25

1 square yard of new brick work requires, for 2 coats, 1.1 lb.; for 3 coats, 1.5 lb.

Cream Color.

	1st coat.	2d coat.
White-lead, in oil	66.6	70.
French yellow	3.3	3.3
Japan varnish	1.3	1.3
Raw oil	28.	24.5
Spirits turpentine	2.25	2.25

1 square yard of new brick work requires, for 1st coat, 0.75; for 2d coat, 0.3 lb.

Black Paint (for Iron).

Lampblack	28	Linseed oil, boiled	73
Litharge	1	Spirits turpentine	1
Japan varnish	1		

The varnish and turpentine are added last.

Liquid Olive Color.

Olive paste	61.5	Dryings	3.5
Boiled oil	29.5	Japan varnish	2.
Spirits turpentine	5.5		

Paint for Tarpaulins (Olive).

Liquid olive color	100	Spirits turpentine	6
Beeswax	6		

1 square yard requires 2 lbs. for 3 coats.
Dissolve the beeswax in the turpentine, and mix the paint warm.

LACKER *for Iron Ordnance.*

Black-lead, pulverized	12	Red-lead	11
Litharge	5	Lampblack	5
Linseed oil	66		

Boil it gently for about 20 minutes, stirring it constantly during that time.

Lacker for Small Arms, or for Water Proof Paper.

Beeswax	18.	Spirits turpentine	80
Boiled linseed oil	3.5		

Heat the ingredients in a copper or earthen vessel over a gentle fire, in a water bath, until they are well mixed.

Lacker for Bright Iron Work.

Linseed oil, boiled	80.5	Litharge	5.5
White-lead, ground in oil	11.25	Pulverized resin	2.75

Add the litharge to the oil; let it simmer over a slow fire for 3 hours; strain it, and add the resin and white-lead; keep it gently warmed, and stir it until the resin is dissolved.

STAINING WOOD AND IVORY.

Yellow. Dilute nitric acid will produce it on wood.

Red. An infusion of Brazil-wood in stale urine, in the proportion of a lb. to a gallon for wood, to be laid on when boiling hot, and should be laid over with alum water before it dries.

Or, a solution of dragon's blood in spirits of wine may be used.

Black. Strong solution of nitric acid, for wood or ivory.

Mahogany. Brazil, Madder, and Logwood, dissolved in water and put on hot.

Blue. Ivory may be stained thus: Soak it in a solution of verdigris in nitric acid, which will turn it *green;* then dip it into a solution of pearlash boiling hot.

Purple. Soak ivory in a solution of sal ammoniac in four times its weight of nitrous acid.

THE END.

MARINE GLUE.—In response to J. H. P.'s request in regard to marine glue, (in the issue of 22d inst.), I must refer him for a more accurate formula for preparing it to Tomlinson's *Encyclopædia of the Arts and Sciences*, article on glue and shellac. I have not the book at hand, and it is years since I have seen it, but I have made marine glue by its formula. The ether used must be perfectly free from alcohol, as that fluid acts as a precipitant upon india rubber. Heat, however, must be applied in hastening a solution, the best means for so doing being the sand bath. [In my article on glues, you made me say "take the scales" of certain fish; I wrote, "take the skins."]—F. L. J., of Ark.

A CEMENT OF GREAT ADHESIVE QUALITY, particularly said to be serviceable in attaching the brass mountings on glass lamps, as it is unaffected by petroleum, may be prepared by boiling three parts of rosin with one part of caustic soda, and five parts of water, thus making a kind of soap, which is mixed with one-half its weight of plaster of Paris. Zinc white, white lead, or precipitated chalk may be used instead of the plaster, but when they are used the cement will be

Q. D. O.—Glue will unite leather, and becomes very strong if mixed with white-lead paint; such a mixture was sold some time ago in the streets of New-York as a new and wonderful cement for uniting leather straps and belting without rivets. As a proof of its strength, a heavily-loaded two-horse wagon was drawn by leather traces made of pieces of leather, all stuck together by this compound.

A. E. S., of Mo.—In the oxychloride of zinc paint, the proportion of oxide of zinc used may be varied. It should, however, not be less than half the weight of the chloride. The object of the tartrate of potassa is to prevent too rapid drying. This may, therefore, be used in variable proportions. The amount of water and starch used depends upon the consistency required. Experience can be the only sure guide in these particulars. By a few preliminary experiments with small quantities you will probably be able to succeed.

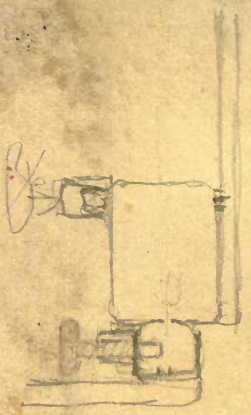
erations cannot be continued. Branch pipes, also with suitable metallic plugs are also provided, so that in case of fire, the melting of the plugs will allow the escape of the asphyxiating gas or gases to extinguish the fire.

The idea of preventing burglars from working in this way is ingenious. The escape of a small quantity of arsenic acid, carbonic oxide, sulphuretted hydrogen, or other gases that might be employed for this purpose, would [illegible] the air of a close room in a few seconds [illegible]

MUTUAL,
No. 254 Broadway, New-York.
ASSETS $2,500,000. ASSURED MEMBERS, 41,000.
Good Agents wanted, to whom liberal terms will be given.

develop their ill effects on the approach of warm weather, and then suddenly.

The possibility of approaching danger having been indicated by the analyst, it may often be turned aside by a little attention to surface drainage, which is most commonly the source of contamination. Surely it is worth while to spend a guinea or two in order to prevent a pestilence whose cure



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